THE AMERICAN GAS LIGHT JOURNAL

REDMAN&KENNY,N.Y.

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME LXXXI. No. 19. Whole No. 1,535. | NEW YORK, MONDAY, NOVEMBER 7, 1904. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager. THOMAS J. CUNNINGHAM and ELBERT P. CALLENDER, Editors.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

Published on each Monday of the year, at No. 42 Pine Street, New York.

Telephone.—2996 John.

The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

Where to Find the Western Gas Association's Exhibit, and the Custodian Thereof, at the World's Fair.

To the Fraternity: The exhibit of the Western Gas Association, at the World's Fair, St. Louis, is located in Section 33A, Liberal Arts Building, where Mr. Fred. R. Persons, who is in charge of the same, will always be on hand to receive visitors and to explain anything that requires explaining.

[NOTICE.]

To Whom and Where Communications for the Secretary of the American Gas Light Association Should be Addressed.

Mr. A. E. Forstall, former Secretary of the American Gas Light Association, informs us that all communications for the American Gas Light Association should be addressed to George G. Ramsdell, Secretary, No. 530 Broadway, New York city.

[NOTICE.]

Bureau of Information, Ohio Gas Light Association.

CITY OF LINCOLN GAS CO.,
LINCOLN, ILLS., Oct. 10, 1904.

To the Fraternity: At the last meeting of the Ohio Gas Light Association a Bureau of Information was decided upon, the idea of which is to render assistance to members who may have questions coming up or difficultles arising respecting which they would like some help. This Bureau has been established and is now ready for business. A number of co-Editors have been appointed to whom the various questions will be referred. As this is the first Bureau of Information attempted by any Association, it is hoped that the members will take advantage of its opportunities. The co-Editors are as follows:

Distribution.—E. E. Eysenbach and M. E. Malone.
Accounts and Bookkeeping.—D. W. Low and Chas. Ritter.
New Business and Gas Appliances.—Frank D. Moses, Ralph Woodward and F. Cavanagh.
Chemistry.—H. B. Harrop and Clarence Lomax.
Retort House.—Moses Coombs.
Natural Gas.—W. H. Hammon and Geo. W. Barnes.

All questions should be addressed to the Editor, at Lincoln, Ills.

Very truly yours,
H. L. OLDS, Editor Information Bureau.

[OFFICIAL NOTICE.]

Wrinkle Department, Western Gas Association.

OFFICE OF EDITOR WRINKLE DEPARTMENT,
ST. LOUIS, MO., July 25, 1904.

To the Members of the Western Gas Association: We again invite contributions to the Wrinkle Department of the Western Gas Association for the meeting of 1905. The Editor wishes to call the attention of the members of the Western Gas Association, and of the gas fraternity at large, to the fact that the "Western" has done good work in this department in the past; that its Wrinkles have been of value to many, and that it proposes to continue the good work.

The Editor further wishes to suggest that an earnest effort be made to improve the quality of the Wrinkles submitted, as a great many of the devices, while of undoubted practical value, are such as any gas works' foreman should know. We desire the Wrinkles which have a greater bearing on the scientific and technical portion of our business. Of course, there will always be room for the little, handy, practical devices, which so often help us over the rough places. We will gladly receive them, but we should all aim to place the gas business on a par with other scientific and engineering enterprises which are practically in a basis of exact knowledge and high efficiency.

To that end, therefore, we desire to secure a large collection of Wrinkles for the 1905 meeting. Give us the benefit of the mathematical, chemical, thermal and [redacted] devices which have helped you in designing or improving your [redacted] send in the practical devices which are not on record so far; submit the ideas which have made the business end a success; and, finally, let every individual

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contribute his portion, so that the result may be worthy the achievements of the past, and a credit to the Western Gas Association.

The following wrinkle is submitted as a sample to guide others somewhat in working out their contributions to this department. This describes a method of regulating the pressure on the outlet of a holder in proportion to the rate of sendout, and was contributed by the writer to another Association some time ago.

"The essential idea of street pressure regulation is to maintain a certain pressure at the consumers' meters within a small percentage either way of the fixed pressure. As the consumption increases or decreases, the holder pressure should be raised or lowered. This is usually done by having recording pressure gauges located in the district supplied by the holder, and raising or lowering the holder pressure until the best average for the district is reached.

"Now, it is, of course, true that the same conditions of consumption never obtain on successive days or months, and, therefore, the following automatic indicator was suggested by the writer: In the outlet pipe of the holder we place a Pitot tube facing the holder. Naturally, the opening from the Pitot tube which faces the stream of flowing gas gives the pressure due to the sum of the static head plus the impact or velocity head, whereas the side openings give the pressure due to the static head only. Therefore, any variation in the rate of flow of the gas is at once indicated by the variation in differential pressure from the two openings of the Pitot tube.

"By using a very sensitive differential pressure gauge, we can thus observe this variable rate of flow. It is, of course, necessary to calibrate the instrument for each holder to be able to tell what pressures to carry on the outlet pipe for each division on the sensitive differential gauge, and it would probably be well to check this three or four times during the year. The Laclede Gas Light Company has so far secured three satisfactory types of extremely sensitive differential pressure gauges, and we have arranged them with two scales, one of which shows the divisions in millimeters and the other gives the proper pressures to be carried on the holder outlet opposite the indicator on the gauge. The writer purposely refrains from adding drawings or too much detail to the above description, as he merely wishes to submit one idea, which he hopes will suggest many others to help swell the contributions."

We must start the work at once; therefore, please send your ideas to the Editor, 716 Locust street, St. Louis, Mo., and oblige, Yours truly,

W. A. Baehr, Editor Wrinkle Department.

BRIEFLY TOLD.

An Inspection Trip to Lynchburg, Va.—"M. D. T.," writing to the Journal under date of the 29th inst., says: "A very pleasant as well as profitable aftermath of the Washington meeting of the American Gas Light Association was an excursion to Lynchburg, Va., organized by Mr. Daniel R. Russell. The party all agreed that 'Danny' must have spent considerable time in Virginia during the erection of the Lynchburg gas plant, to absorb to the fullest the proverbial hospitality of the Old Virginian. There were several hosts encountered at Lynchburg and the visitors were treated to a complete demonstration of a characteristic quality which has made Virginia famous. The party as the guests of the Parker-Russell Mining and Manufacturing Company, of St. Louis, who installed the benches, producers and charging hoppers and apparatus at the Lynchburg works, left Washington at 10 P.M. Friday, on a special sleeper provided for the trip, arriving at Lynchburg about 3 A.M. The sleeper was left on the siding and the party were awakened at 8 A.M. Mr. R. D. Apperson, President of the Lynchburg Traction and Light Company, met the party and escorted them to a special trolley car which landed them at the principal hotel of the city in time for breakfast. After breakfast the gas plant was visited where 2 benches of 6's, inclined retorts, were in operation, the furnaces being supplied with fuel from outside Taylor generators. The purifying boxes in this plant are cement 6-inch walls, and the holder tanks, which are about one-half underground, are built of cement reinforced with expanded metal. One of these holder tanks has been in operation now for several months and there was no indication that this character of construction is not all that could be desired. The coal in this plant is handled by Link-Belt machinery entirely and the storage bins are filled with dump cars from the top. The coke from the plant is handled by over-head electric trolley line from the street car current of 500 volts. The works are located in the valley of Black Water creek, a branch of the James river. This valley is crossed by a viaduct, for vehicle and foot traffic, as well as the street car line, which is immediately adjacent to the gas works. This viaduct is about 140 feet above the bottom of the valley, and in passing over it one looks down upon the gas works from a perfect bird's eye view. Mr. Apperson has appreciated the advantages of his opportunities and the top of his holder is embellished with a design of some character in an admonition to use gas for cooking and other domestic purposes. After looking over the gas works from one end to the other the electric power plant was visited and a special train carried the party up the valley of the James river to the new water power plant being installed by the Lynchburg Traction and Light Company. This work is well under way and the destinctive feature is that all of the masonry is concrete. The party then visited the Glamorgan Pipe and Foundry Company's works where they saw a modern plant in every particular. It was also intended to visit the McWayne pipe works, but time being limited we were conducted by special trolley car from the Glamorgan shops to the Piedmont Club where an elegant luncheon was served to a convivial party.

"Our hosts at Lynchburg were the officials of the Light and Traction Company, the Glamorgan Pipe and Foundry Works and the Mc Wayne Pipe Works, as follows: Lynchburg Light and Traction Company: R. D. Apperson, President; Charles R. Miller, Vice-President; C H. Hogshead, Superintendent Gas Department; A. J. Coler, Chief Engineer; A. E. Anderson, Chief Electrician.

"Glamorgan Pipe Works: W. C. Foster, Vice-President and General Manager; W. J. Drummond, Second Vice-President; A. M. Campbell, Secretary.

"McWayne Pipe Works: H. E. McWayne, President. General regret was expressed over the absence of Mr. Frederick H. Shelton, who was unexpectedly summoned by telegraph from Washington on a business matter which would not stand delay. It is to Mr. Shelton's care and direction that the plants of the Lynchburg Light and Traction Company have been brought to their up-to-date stage. The rank and file of the party were: J. W. Ellis, Providence, R. I.; H. W. Starr, Schenectady, N. Y.; Waldo A. Learned, Newton, Mass.; Charles A. Learned, Meriden, Conn.; B. C. Cobb, Detroit, Mich.; W. H. Barthold, Saginaw, Mich.; H. F. Coggshall, Fitchburg, Mass.; C. L. Gerould, Chicago, Ills.; S. E. Wolff, Jackson, Mich.; Thomas D. Miller, New Orleans, La.; D. R. Russell, St. Louis, Mo.; Leigh Wickham, St. Louis, Mo.; S. B. Russell, St. Louis, Mo.; G. W. Parker, New York; R. B. Combs, Philadelphia, Pa.; and A. K. Quinn, Newport, R. I. The trip was a most enjoyable one."

Notes—

Some time ago we noted the resignation of Mr. Roger W. Polk as Superintendent of the Peoples Gas Light Company, of Rutland, Vt., in order to accept a responsible place with the Laclede Firebrick Manufacturing Company, of St. Louis. A pleasant incident connected with his saying good-bye to the men who worked under him at Rutland was that on the morning of his departure he was summoned to the office of the Company and was there confronted by "his men," who lost no time in presenting to their former chief a handsome Elks' emblem in the form of a watch charm. The presentation speech was neatly made by Mr. Wm. P. Jones, who eloquently voiced the regret of the men over Mr. Polk's going from them and fervently wished the best of luck for him in the future. Mr. Polk was seemingly not in good frame to make a speech that morning, but he finally pulled himself sufficiently together to thank the men for their remembrance and to repeat to them that he would ever keep in mind the harmoniousness of their relations, when they were working together.

The proprietors of the P. H. & F. M. Roots Company, of Connersville, Ind., inform us that they have been awarded the grand prize and gold medal by the Jury on Awards for the examples of exhausters shown by the Company at the World's Fair, St Louis.

The special meeting of the stockholders of the Watertown (N. Y.) Gas Company, called for the purpose of determining whether the capital stock shall be increased from $100,000 to $500,000, will be held to-day.

Mr. Henry Allen, for many years a trusted employee of the Gas Light Company, of Augusta, Ga., died at his home in that city the morning of October 25th. He was in his 69th year.

At the annual meeting of the Phœnix (Pa.) Gas and Electric Company, the following Directors were re-elected: E. P. Norris, J. W. Pennypacker and I. J. Browes, of Phœnixville; J. W. Thompson, of Mont Clare; E. L. Thomas, Royersford; F. H. Shelton and E. C. Miller, of Philadelphia; J. A. Campbell, of Chester; and J. H. Lippincott, of Camden, N. J.

Methods of Charging for Gas.

[A paper prepared for and read at the Thirty-second Annual Meeting of the American Gas Light Association, by MR. FRANK W. FRUEAUFF, Denver, Col.]

Introduction.—The intention in this paper is to discuss the present methods of charging for gas, also the effect of the present methods on development of the business, and to question the methods of charging in an endeavor to find whether a better system can be developed.

Importance of Proper Methods.—Those members of this society who have followed the recent work done in the electrical fraternity I think will agree with me when I say that the future of the gas business depends more on a rational method of charging than upon any engineering problem involving the manufacture or distribution of gas. The rate problem, when thoroughly analyzed, comes down to a problem in engineering and economics, and it therefore cannot be considered too closely, so I hope I may be pardoned in going into considerable detail in the discussion of gas rates.

History.—I shall not attempt to go into the history of rate making, except in explanation of our present methods, and attempt to determine whether any convincing work has been done on this subject which would warrant the confidence many gas managers have in our present methods of charging. The invention of gas and its application for illuminating purposes required some method for determining the rates to be charged. The first rates made were flat rates, made arbitrarily and following varying conditions. However, owing to the great variation in consumption by different consumers, this method proved extremely unsatisfactory for both the companies and the consumers. This resulted in the invention of gas meters, and probably without any attempt to analyze the economic features of the gas business, it was believed that the cost to the company and the value to the consumer would vary in exact proportion to the amount of gas consumed. Consequently, the straight meter rates of so much per thousand were adopted. At the outset no mention was made of meter rentals, but eventually the meter rent was introduced, and was probably intended to cover exactly what its title indicates. However, in late years the charge for meter rent has in reality become a minimum charge, and is in no sense a meter rent charge. In some places the term "meter rent," handed down from the early pioneers of the gas business, has been substituted for the name "minimum bill" or "service charge." With some gas companies a minimum rate was charged per 1,000 cubic feet of gas, and every user of gas was charged a fixed amount of meter rental, depending upon the size of the meter. As this charge became more in the nature of a minimum bill, meter rents were discontinued with all consumers except those burning less than a specified amount of gas. How the first meter rates for gas were arrived at no one seems to know. As years have gone by, these rates have been cut, either voluntarily or by ordinance, without any apparent regard to the actual connection between cost and profit. Most of you will agree that this has been the case where rates have been reduced by ordinance, but is it not also true that where voluntary reductions have been made the cut has been fixed without due regard to our costs? Our only knowledge was that we had an average profit of so many cents per 1,000 cubic feet sold, and we therefore felt justified in making a horizontal reduction per thousand. During the early period of the gas business the expense of manufacture was relatively larger as compared with the other expenses. The first recognition of expenses other than those proportional to manufacture is evidenced by some of the arguments in attempts to develop gas for fuel purposes. It was argued that the gas mains were practically idle during the day time, and if gas could be sold for fuel purposes it should not be charged with the full amount of the company's fixed expenses. This brought about the adoption by many gas companies of a lower rate for fuel gas, the lower rate really being made necessary to make it a competitor of other fuels, but to justify the lower rate the above argument as to idle mains was used. As the field for fuel gas developed, the time was finally reached with many companies when the greater portion of the gas was sold for fuel purposes, and the argument was then frequently made that whenever the sales for fuel purposes exceeded those for lighting purposes the gas plant was primarily one for fuel gas, and that this gas should bear at least its full proportion of the general fixed expenses, and perhaps even a larger portion, the idea being that the plant was rapidly becoming primarily a fuel gas plant and incidentally a lighting gas plant. Many of the prominent gas managers are on record as advocating a uniform price per 1,000 cubic feet, regardless of the purpose for which it is sold, but if, after a study of the tables appended hereto, they are still of the opinion that a uniform rate should exist, I shall feel that my efforts in this paper have been misdirected. Up to the present time no serious departure has ever been made from the usual practice of charging for gas sold strictly on a meter basis. Some minimum charges have been made, but they were insignificant and of no particular effect. Lower rates have been made for the use of gas for fuel purposes, and in many instances discounts are given for gas sold in large quantities, but none of these have been a serious departure from the methods adopted by the early gas men. To consider the economics of methods of charging for gas, we can advantageously review some of the recent controversies regarding rates which have arisen among the members of the electrical fraternity, and in considering these controversies we must also consider some of the differences between the gas and electric business and other classes of business.

Special Features of the Gas Business.—The public look upon the gas business as a manufacturing business, and in our dealings we usually convey that impression to the consumer. In reality, however, our business is largely an investment business, and we may well compare it to an investment in improved city real estate, where the bulk of the expense represents the interest on the investment, and the smaller part the actual running expenses. The majority of all our expenses are not those occasioned by manufacture, and consequently they do not vary with output, but are largely fixed by other factors. A very large investment is required for a small annual return, the bulk of this investment being in our distributing system, particularly where water gas is manufactured. The peculiar feature of the gas business as compared with other ordinary lines of business is the fact that the consumer fixes the demand, or, in other words, the amount of our business which is invested and set aside for his particular use, and which is not available for other consumers. The demand made by the consumer fixes the size of the meter required and size of service pipe necessary, and the simultaneous demand of all consumers fixes the size of our trunk lines, distribution and feeder mains. The size, and consequently the investment, of every portion of our distribution system is fixed, not by the total sales of gas, but by the instantaneous maximum demand. A few words showing the relation of sales to maximum demand may make this statemore convincing. The usual demand of each consumer is generally so large that not less than a 5-light meter is required. At some time during the year this meter is taxed to its utmost capacity, and yet if the meter was run to its maximum capacity continuously it would pass nearly 1,000,000 feet of gas per year. However, we know that the average consumer does not use in excess of 30,000 cubic feet of gas per year, consequently, for the sake of selling 30,000 cubic feet of gas per year, we must supply a measuring instrument capable of passing 1,000,000 feet. This argument is also true of the consumer's service pipe and the distributing main, but for the distributing main we need only furnish conductivity to care for the maximum instantaneous demand of a group of consumers, and for feeder mains we need only supply conductivity for the greatest simultaneous demand of all our consumers. The relation of revenue to investment depends largely on the relation of our annual sales to the gas demanded at any given instant. If gas were sold for lighting purposes only, our feeder mains would have to have a conductivity of not less than 13 times the average rate of sendout. However, as we sell gas for other purposes at a time not coincident with the peak of our lighting load, our sales become greater when compared with the maximum demand, and with the average gas company, selling half of its gas for fuel purposes and half for lighting purposes, the size of the mains need not exceed the average demand by more than 5 or 6 times. This peculiarity of the gas business is also common to the electrical, water and district heating business, but is not common to any other class of business, and for this reason the law of averages applies less aptly than in other ordinary lines of business.

History of Charging in the Electric Business.—The electric business had not developed to any great extent before meters were available. These meters were not entirely satisfactory, and for this and other reasons, including the great cost of them, flat rates continued in pretty general use even after meters were put upon the market. Like the gas man, the electric man found he could not afford to sell current at flat rates indiscriminately, and meter rates were adopted and have been continued on the principal argument that this policy had been pursued by gas companies and had proven successful. There was, however, a degree of difference between the gas and electric business which forced the electric man to realize the inequity of this method of charging. The gas man did not realize the effect of competition with the electric central station because of his rapidly developing field for fuel gas, and while he lost customers of a profitable nature, he took on other customers in a new field of a less profitable nature and his loss was, therefore, less

apparent. The electric man, however, after developing his business to a certain extent, found the isolated plant a serious competitor, and he was gradually forced to the realization of the fact that there were many large consumers who could supply themselves current at a less cost than he could show from his own operation. For years the average central station man felt that the lesser cost to the isolated plant than the average cost of his plant was due entirely to the quality of current consumed by the light user having his own plant. This belief has gradually faded away and the recognition is now very general that long-hour consumption was the most desirable and that total quantity of consumption was not the true factor. Considerable agitation then resulted regarding load factor, and the continual "bug-a-boo" of the electric man was to find out how to sell current during times when his machinery was not demanded for his lighting load. This resulted in special rates being made for consumption at unusual hours. The Wright demand system was introduced in Brighton, England, and rapidly came into favor in this country. The Kapp system was also brought out and found many warm admirers, it being taken up and pushed by the General Electric Company. Many believed that one or the other of these two systems would solve the perplexing problem and would eventually come into universal use. At the convention of the National Electric Light Association, held in May, 1900, another system of charging was proposed by Mr. Henry L. Doherty. Consideration of these methods of charging may prove an excellent method of leading up to the question of how charges should be made for gas.

A Study of Different Methods of Electric Charging. Meter Rates.—Probably up to 10 years ago charging at a uniform rate per kilowatt hour on a meter basis was considered good practice. Discounts were made for large quantities of consumption and were considered permissible and advisable. Meter charging among electric companies was not, however, as satisfactory as among gas companies. The constant losses in the shunt coils of the meters were known to exist and these losses often amounted to as much as 100 kilowatt hours per year. Most of the electric meters were also sluggish on light loads and many would fail entirely to register the consumption of 1 or 2 small lamps. If a large installation was made, a meter was necessary which would be ample to take care of the entire installation, and the meter would increase the amount of loss on light loads. To provide against these losses it became customary to make a minimum charge, this bill being generally from $1 to $1.50 per month per consumer, regardless of the number of lamps instulled.

The Wright Demand System.—The first radical departure, and I believe the first rational system of charging proposed, came from Mr. Arthur Wright, of Brighton, England. His attempts were made along the line of filling up the low points in his load curve and his system was fairly well adapted to English practice. A brief description of this system as used in America is as follows: A demand meter is used which registers the maximum demand made on the station during the month. If this demand meter indicates a maximum of 20 lamps, the consumer is charged at a high rate per kilowatt hour for 2 hours' use of 20 lamps, provided the consumption indicated on the integrating meter exceeds 2 hours. This charge we will assnme is on the basis of 20 cents per kilowatt hour. For the consumption of the maximum for the first 2 hours, or a fractional part, the uniform rate of 20 cents per kilowatt is charged, and for any excess current a charge is made at a much lower rate, even as low as 5 cents per kilowatt hour. This system is a step towards greater equity in charging, but has some serious disadvantages. The first is the fact that all consumers below a certain time factor of burning pay the same rate per kilowatt hour, and yet it is evident that the consumer, using his maximum demand 2 hours per day, can be supplied at a lesser rate than the consumer using his maximum demand but 1 hour per day. Another inequity in this system results from the fact that one consumer's maximum may only average ½ per day for 11 months in the year and during the 12th month he may use his installation an average of 6 hours per day and receive a marked discount during this month, although he has not averaged 2 hours per day consumption for the entire year; while another consumer may average slightly less than 2 hours per day in every month of the year, and yet the total use of his equipment will exceed the use of the equipment of the consumer given in the first example.

The Kapp System.—This was another attempt to fill up the low point in the load curve, but this system of charging, in common with the Wright demand system, does not demonstrate equity in practice; a description of this being as follows: A meter is required having two dials and a clock. The clock is used to operate mechanism which will put one dial in plane with the meter during given hours of the day and the other dial the balance of the day, one dial registering all current consumed during the peak period, say from 5 o'clock in the evening to 11 o'clock at night, the other dial registering the current from 11 o'clock at night until 5 o'clock the following evening. The current registered on the first dial is charged for at the rate of say 20 cents per kilowatt hour, while the current registered on the second dial is charged for at the rate of 5 cents per kilowatt hour, the idea being to put a premium on daylight or unusual hour consumption. This system of charging, like the Wright demand system, has the disadvantage of not distinguishing between expenses which are of a general fixed character and those which may be known as "consumer expenses." It is evident that one man having 60 lamps and using say 1,000 kilowatt hours per year can be taken care of with less expense to the station than two consumers having 30 lamps each and using 500 kilowatt hours each, or a total of 1,000 kilowatt hours per year. The marked inequity of the Kapp system is of the same nature, although slightly different in character to that pointed out in the synopsis of the Wright demand system. If we assume the base rate at 20 cents per kilowatt hour for current burned during the so-called "peak hours," while daylight current is sold at 5 cents per kilowatt hour, we can assume two consumers of slightly different character, which will clearly indicate how inequitable this system may be. Assume one consumer (A), who burns current 1 hour during the day at a charge of 5 cents and 1 hour during the peak hours at a charge of 20 cents. This consumer's average rate would be 12½ cents. Consider another consumer (B), who burns his installation 2 hours during the peak hours and 1 hour in the day. This consumer pays for 2 hours at 20 cents and 1 hour at 5 cents, or an average of 15 cents per kilowatt hour. B is without doubt the more profitable consumer to the station, and yet A pays a lower average rate for current. Neither the Wright demand nor the Kapp system follows the expense line of the isolated plant, nor do they follow the expense line of the central station, and, consequently, both are inequitable systems of charging, and yet both are a decided improvement on the straight meter rate. The electrical fraternity of this country were about evenly divided in their advocacy of these systems until May, 1900. At that time these systems were vigorously attacked in an introduction to a proposed new method, which we shall here term the "readiness to serve" method of charging, but which is commonly known in the electrical fraternity as the Doherty rate.

"Readiness to Serve" Method of Charging.—One of the distinct feature of this method of charging may be stated as an attempt to not only fill in the low point in the load curve, but to discourage the peak load. For details of this system and the attack made on other systems I refer you to a paper in the 1900 Proceedings of the National Electric Light Association entitled "Uniform, Equitable and Competitive Rates," by Henry L. Doherty. A brief description of this system is as follows: Four factors of expense are recognized. Broadly these four factors may be first stated as two factors. The first factor includes those expenses proportional to output, and their nature is determined by whether or not they vary in proportion to the output. The second factor embraces the fixed expenses, and broadly these expenses do not vary proportionally to output, but vary according to some other factor. These fixed expenses are designated as (1) expenses incidental to each consumer regardless of other expenses, such expenses as the reading of meters, maintaining the meters, collection, office expenses, bill making, etc., being included in this head; (2) fixed expenses caused by the distance from the station (included here would be the line and pole investment); (3) fixed expenses caused by maximum demand, being those expenses occasioned by investment for capacity and those which are peculiar to the general operation of an electric light plant. For reasons of expediency the author excluded the factor of distance from station and based his method of charging on three general factors; (1) consumer expenses, (2) capacity expenses or maximum demand, and (3) output expenses. The consumer expenses have already been partially explained. They consist of the reading and maintaining of meters, the shunt losses of the meters, and all other expenses which vary directly with the number of consumers the station must supply. The second factor, "maximum demand," is charged for as a distinct item in addition to the charges made to each consumer, on the theory that this is what fixes the amount of the investment, the amount of the core losses and those other items which are in no way related to the consumer expenses, nor to the output expenses, and yet are directly related to our maximum demand and to our general expenses. No distinction is made of the time of day his maximum demand is required for reasons which will be explained later. To these two charges a charge is added representing the consumption of current, and this charge covers all items which vary in proportion to consumption, consisting of boiler fuel, boiler room, labor (above a certain minimum), lamp renewals,

arc carbons, etc. This charge per kilowatt hour is very small, and presumably, for the average consumer, the sum of all the charges will be about equal to the charge that would be made on a meter basis if all current was sold on a meter basis, except that the effect is such that there is a tendency to diminish the expenses to the station per kilowatt hour sold. This proposed system of charging received almost universal condemnation by the delegates in attendance at the convention. Probably the criticism of the other systems partially accounts for this.

The proposed method was not easily understood and it was considered far too radical. A heated discussion ensued, lasting for a considerable time after the adjournment of the convention. The writer, in descending from the floor on which the convention was held, overheard a conversation in the elevator in which one of the prominent electric men said, "And he is actually going to try it in a plant he has charge of. Now what do you think of that?" The adoption of this plan of charging has not been general. Its announcement, however, had a marked effect on the central station business and has stopped the spread of other methods of charging. It has caused the central station managers to recognize the nature of their business and the distinction between the different classes of expense and the profitableness of different consumers. The methods advocated in this paper have frequently been used as a means of computing what constitutes just discrimination and also what justifies such discrimination. Instead of bringing about uniform methods of charging as advocated by the writer, it has perhaps had a tendency to encourage further discrimination by pointing out the different expenses to the station in supplying different classes of consumers. Whether this system will eventually be adopted or not, it seems to me that the principles advocated are gradually being recognized by all gas, water, electric and district heating companies. While originally the writer was seriously opposed to this method of charging, I have now become one of its strongest advocates and believe it is thoroughly applicable to the gas business.

The Manner in which this System has been Introduced.—As it has been customary to charge consumers so much per 1,000 kilowatt hours, and many have incurred an investment for wiring their houses on their belief in the continuation of this method of charging, it has been found impossible to force a new method of charging on all consumers, where the change would be a disadvantage by increasing the expense to the consumer. It is, however, recognized by all gas and electric light managers that there is a constant downward trend of prices, and it is my belief that all future reductions should be made to profitable consumers only. What justification have we for reducing the rate to consumers who are already unprofitable? When necessity arises for a reduction in rates, this method of charging may be put in vogue by either a gas or electric light company and made optional with their consumers. This will result in the profitable consumers securing a reduction in rates, while the unprofitable consumers will be kept on the old rate, and will not be made more unprofitable, which would result if the reduction were in the nature of a horizontal reduction. To the writer's knowledge, this method of charging has not been adopted by any gas company. A so-called adoption has been made by one small Eastern company, and while they use the term "Readiness to serve," their charge embraces only a portion of their consumer expenses and entirely neglects the expenses occasioned by maximum demand. The system has been adopted by a number of electric companies as originally advocated by some companies with slight changes, and by many companies it has been used as a method of finding what average price can be quoted. From the adoption of this method in the electric business the effect on the gas business can be prognosticated, and the abstract consideration of the problem will also indicate the result which has ensued from using it.

The Effect of this System of Charging on Consumption and Revenue.—As above stated, the announcement of this proposed method of charging met with the prediction that disaster would follow. They argued that consumers would not understand the method of charging and that an understanding of the method was necessary. They believed that it was too complicated. My observations enable me to state that most consumers can be made to understand the system of charging fairly well, that many of them are thoroughly conversant with it, and once they understand it they are its strongest advocates, and yet I do not consider a thorough understanding of the system by the consumer as absolutely essential to its satisfactory working. It may be stated that the straight meter rate, as now charged, is thoroughly understood by the consumers, but we all know that it is not entirely satisfactory. Other systems may not be thoroughly understood and yet they are satisfactory. By taking a certain example I think I can show conclusively why we might reasonably expect more satisfactory results from this method of charging than from present methods. I hope I will be pardoned for using examples as applied to the electric business, for I am aware the electric system of charging adapts itself admirably to gas, except for the difficulty of fixing the maximum demand. Assume a certain consumer is buying current on a meter basis at a rate of 10 cents per kilowatt hour and is paying $100 per year. Suppose you agree to sell this consumer current for 5 cents per kilowatt hour plus a fixed charge for "Readiness to serve" of $50 per year, this "Readiness to serve" to be paid in 12 equal monthly installments. By a study of the schedule of lighting hours which I have attached hereto, you will readily see that after adopting this method of selling the consumer's small bills will be raised and his large bills will be lessened, thereby producing a greater uniformity of bills throughout the year. These 3 tables are of particular value in satisfying consumers who do not realize the rapid increase in lighting hours in the fall months. Anyone who has officiated as complaint clerk in a gas company knows that it is not the size of bills which causes the greatest dissatisfaction and complaint, but it is the irregularity of the bills, a consumer will pay a flat rate of $5 per month or $60 a year and never register a complaint, and yet if his bill amounts to $60 per year on a meter basis, his largest bill may be as much as $12 in one month, and the excess of this large bill over his average or smallest bill is apt to produce dissatisfaction and a vigorous kick. As a rule, consumers do not know their yearly expense for light. A large bill is apt to produce a complaint at the gas company's office and result in rigid economy in the consumption of gas or current at the man's store or residence. Anything, therefore, that will conduce to uniformity is apt to produce greater satisfaction and also tends to prevent the use of rigid economy on the part of the consumer, his family or servants. I insert here a table showing what the consumer's bills would be on a meter basis and on the method advocated herein, assuming that in each case the consumer burns $100 worth of current in one year's time, and that he uses service until 10 P.M. each evening. From a study of this table you will note that the consumer's smallest bill under the meter rate is but 2.6 per cent. of his total yearly bills, while the largest bill is 14.1 per cent. of the total bills, or that his largest bill is 5.4 times as great as his smallest bill. Under the "Readiness to serve" method of charging for the same consumption, the smallest bill is 5.47 per cent. of the total bills, while the largest bill is 11.22 per cent., or but 2.1 times as large.

TABLE No. 1.—*Showing Number of Hours Artificial Light is Needed in Each Month of the Year.*

Evening from	July.	August.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Total.
Dusk to 6 o'clock	.....	.....	2	33	62	80	65	33	4	.....	.....	.....	279
" 7 "	.....	14	22	62	92	111	96	61	31	4	.....	.....	493
" 8 "	.....	40	52	93	122	142	127	89	62	28	4	.....	759
" 9 "	13	71	82	124	152	173	158	117	93	58	29	8	1,078
" 10 "	44	102	112	155	182	204	189	145	124	88	60	38	1,443
" 11 "	75	133	142	186	212	235	220	173	155	118	91	68	1,808
" 12 "	116	164	172	217	242	266	251	201	186	148	122	98	2,183
All night	217	307	345	421	473	527	512	411	382	295	242	195	4,327
Morning from													
4 o'clock to dawn	.....	16	48	80	110	137	137	93	71	28	2	.....	722
5 " "	.....	.....	18	49	80	106	106	70	40	3	.....	.....	472
6 " "	.....	.....	.....	18	50	75	75	42	9	.....	.....	.....	269
7 " "	.....	.....	.....	.....	20	44	44	14	.....	.....	.....	.....	122

TABLE NO. 2.—*Showing Per Cent. of Lighting Hours in Each Month to Total Number of Hours Artificial Light in Year.*

Evening from	July.	August.	Sept.	October.	Nov.	December	January.	February.	March.	April.	May.	June.	Total.
Dusk to 6 o'clock			0.7	11.8	22.3	28.7	23.3	11.8	1.4				100 per cent.
" 7 "		2.8	4.5	12.6	18.6	22.5	19.5	12.4	6.3	0.8			"
" 8 "		5.3	6.9	12.3	16.1	18.7	16.7	11.7	8.1	3.7	0.5		"
" 9 "	1.2	6.6	7.6	11.5	14.1	16.1	14.6	10.9	8.6	5.4	2.7	0.7	"
" 10 "	3.0	7.1	7.8	10.7	12.6	14.1	13.1	10.1	8 6	6 1	4.2	2.6	"
" 11 "	4 1	7.4	7.9	10.3	11.7	13.0	12.2	9.6	8.5	6.5	5.0	3.8	"
" 12 "	5.3	7.5	7.9	9.9	11.2	12.2	11.5	9.2	8.5	6.7	5.6	4.5	"
All night	5.0	7.1	8.0	9.8	10.9	12.2	11.8	9.5	8.8	6.8	5.6	4.5	"
Morning from													
4 o'clock to dawn		2 2	6.7	11.1	15.2	19.0	19.0	12.9	9.8	3.9	0.2		100 per cent.
5 " "			3.8	10.4	17.0	22.4	22.4	14.8	8.5	0.7			"
6 " "				6.6	18.7	27.9	27.9	15.6	3.3				"
7 " "					16.4	36.1	36.1	11.4					"

TABLE 3.—*Showing Per Cent. of Increase or Decrease of Hours of Artificial Light over Previous Month.*

Evening from	July.	August.	Sept.	October.	Nov.	December.	January.	February.	March.	April.	May.	June.	Total.
Dusk to 6 o'clock				1,450.0	88.0	29.0	—18.7	—49.3	—88.0				
" 7 "			55.2	181.9	48.4	20.7	—13.5	—36.5	—49.2	—87.2			
" 8 "			30.0	78.9	31.2	16.4	—10.6	—29.9	—30.2	—55.0	—85.8		
" 9 "		446.0	15.5	51.3	22.6	13.8	—8.7	—25.9	—20.5	—37.6	—50.0	—72.5	
" 10 "		131.7	9.8	38.4	17.8	12.1	—7.3	—23.3	—15.0	—29.0	—31.8	—36.7	
" 11 "		77.3	6.8	31.0	14.0	10.8	—6.4	—21.4	—10.4	—23.9	—22.8	—25.3	
" 12 "		41.4	4.9	26.2	11.5	9.9	—5.6	—19.9	—7.5	—20.4	—17.5	—19.7	
All night		41.4	12.4	22.0	12.3	11.4	—2.8	—19.7	—7.2	—22 8	—17.9	—19.4	
Morning from													
4 o'clock to dawn			200.0	66.7	37.5	24.6	0.5	—32.0	—23.6	—60.6	—93.0		
5 " "				172.0	63.3	32.5	0.0	—34.0	—42.9	—92.5			
6 " "					177.6	50.0	0.0	—44.0	—78.6				
7 " "						120.0	0.0	—68.2					

	Meter Rate.	"Readiness to Serve" Rate.
January	$13.10	$10.72
February	10.10	9.21
March	8.60	8.47
April	6.10	7.21
May	4.20	6.27
June	2.60	5.47
July	3.00	5.67
August	7.10	7.71
September	7.80	8 07
October	10.70	9.51
November	12.60	10.47
December	14.10	11.22
	$100.00	$100.00

Another argument in favor of this method of charging which I think will appeal to all is the fact that if the consumer is paying a large portion of his bill as a fixed charge regardless of his consumption, and is paying for current or gas at a low rate per unit, this fact alone is sufficient to insure more liberal use of the commodity and discourage economy. If the consumer must save half his consumption to save one-fourth of his bill, the incentive for economy has been lessened, and if he can burn twice as much current or gas and only increase his bill 50 per cent, there is a sufficient inducement for greater liberality and a tendency to find additional use for the current or gas. At the same time, with the average consumer, were we to supply him with twice as much of our commodity we would not double our expense. Practically all our expenses would remain the same, except those proportional to output. Our consumer expenses would not increase and none of the other expenses would be increased if the maximum demand was not increased. In one central station, under the influence of low rates and the adoption of this method of charging, the consumption has increased from 535 kilowatt hours to 809 kilowatt hours per consumer; and from 16 kilowatt hours per lamp per year to 38 kilowatt hours per lamp per year. The effect of this method of charging can be best judged by the following table of consumption per lamp per year, representing the conditions prevailing before this system of charging was adopted and after it had been in vogue for a period of 28 months:

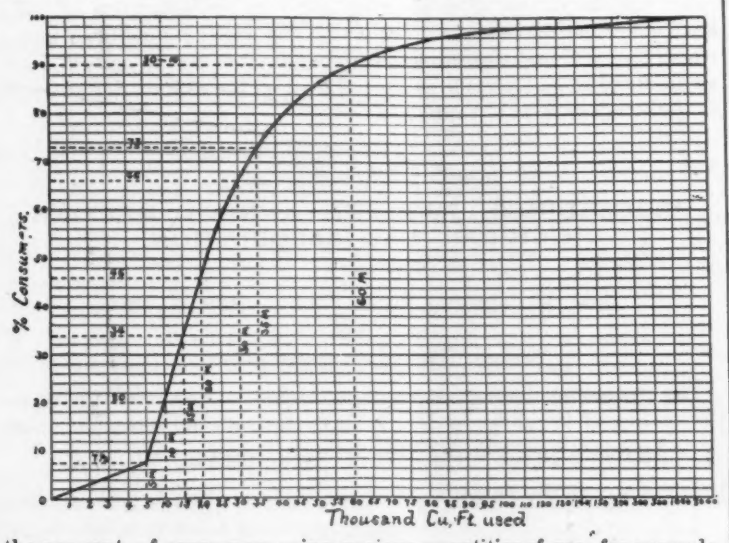
	Before Pr. Ct.	Before Accum. Pr. Ct.	After Pr. Ct.	After Accum. Pr. Ct.
Lamps using less than 1 K.W.	1.35	1.35	....	....
" " 2 "	2.52	3.87	2.47	2.47
" " 3 "	2.75	6.62	.54	3.01
" " 4 "	6.61	13.23	2.44	5.45
" " 5 "	6.23	19.46	3.17	8.62
" " 6 "	6.19	25 65	5.21	13.83
" " 7 "	7.30	32.95	5.10	18.93
Lamps using less than 8 K.W.	5.62	38.57	4.37	23.20
" " 9 "	5.90	44.47	.97	24.27
" " 10 "	5 20	49.67	4.29	28.56
" " 11 "	4.14	53.81	4.54	33.10
" " 12 "	4.64	58.45	2.95	36.05
" " 13 "	3.36	61.81	3.74	39.79
" " 14 "	2.86	64.67	3.37	43.16
" " 15 "	4.07	68.74	2.82	43.98
" " 16 "	1.60	70.34	2.73	48.71
" " 17 "	2.07	72 41	3.17	51.88
" " 18 "	2.85	75.26	3.55	55 43
" " 19 "	1.38	76.64	2.57	58.00
" " 20 "	1.89	78.53	1.75	59.75
" " 30 "	6.83	85.36	14.16	73.91
" " 40 "	3.42	88.78	4.88	78.79
" " 50 "	2.74	91.52	6.06	84.85
" " 60 "	1.50	93.02	2.72	87.57
" " 70 "	.82	93.84	3.03	90.60
" " 80 "	.52	94.36	2.17	92.77
" " 90 "	.98	95 34	1.23	94.00
" " 100 "	1.46	96.80	1.23	95.23
" " 200 "	1.32	98 12	3.49	98.72
" " 300 "	1.52	99.64	.95	99.67
" " 400 "	.36	100.00	.33	100.00

From this table it will be seen that 50 per cent. of the lamps connected used less than 10 kilowatt hours per year before this rate was adopted, and that but 28 per cent. of the connected lamps used less than 10 kilowatt hours per year after the rate had been in effect 28 months. It will also be noted that no consumers are now using less than 1 kilowatt hour per lamp per year, and the consumers using from 20 to 30 kilowatt hours per lamp per year have been increased from 6.83 per cent. of the total consumers to 14.16 per cent. of the total consumers.

Should this System of Charging be Applied to Gas?—While electric companies are affected to a greater degree by the relation of maximum demand to yearly consumption, yet this is an extremely important factor in the gas business also. The problem of developing a market for fuel gas can never be solved alone by the engineers. It is now well known that much of this possible business can only be taken on at rates much lower than those now quoted as straight meter rates. It is possible to sell to some consumers at a slight advance over the cost of manufacture, while with other consumers our present rates are entirely inadequate to yield a proper return. It is apparent to all that if we sell some consumers at less than the cost to us, this loss must be made up by charging profitable consumers more than would be necessary if we had no unprofitable consumers. If we ever expect to develop fuel gas to the utmost we must more closely approach the cost of competitive

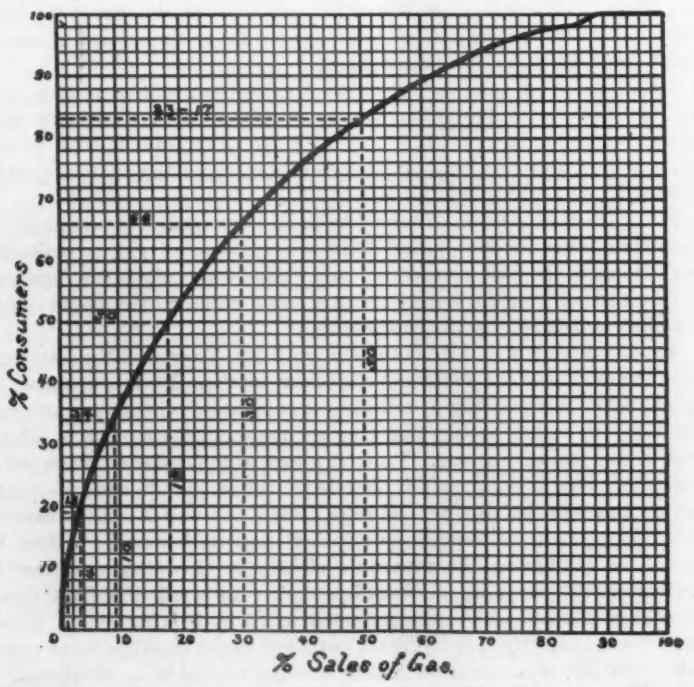
fuels. We must secure practically a uniform rate of sendout, or, stated differently, our lowest total cost will result from the closest approach to uniformity of sendout throughout the entire year and every hour thereof. This ideal condition can only be secured by a method of charging which will premiumize a large consumption for a small demand and penalize a large demand for a small consumption. Perhaps the average gas manager does not realize the difference in degree of profitableness of his various consumers, and I therefore append a table, showing the classification of consumers according to their sales. A careful analysis was made by one gas company of the account of each consumer, showing the amount of gas used and amount paid during one year. These records of consumers were compiled to show the number of consumers, the amount used in each class and the per cent. of consumers and of gas used in each class to total number of consumers and total gas sold. By reference to Table No. 1 you will see

TABLE NO. 1—*Per Cent. Consumers using Various Amounts of Gas.*



the per cent. of consumers using various quantities of gas; for example. 7½ per cent. of all consumers used less than 5,000 feet per year, 20 per cent. of all consumers used less than 10,000 feet per year, 34 per cent. used less than 15,000 feet per year, 46 per cent. used less than 20,000 fee per year, 66 per cent. used less than 30,000 feet per year, 73 per cent. used less than 35,000 feet per year, and only 10 per cent. of all the consumers used to exceed 60,000 feet per year. This table leads to the conclusion that a very large percentage of all our consumers are using gas in very small quantities. By reference to Table No. 2 we have the

TABLE NO. 2.—*Per Cent. Consumers to Per Cent. Sales of Gas.*



per cent. of consumers to per cent. of gas sold. This shows 10 per cent. of all consumers use less than 2 per cent. of the gas sold, 19 per cent. use less than 4 per cent. of the gas sold, 34 per cent. use less than 10 per cent. of the gas sold, 50 per cent. use less than 18 per cent. of the gas sold, 66 per cent. use less than 30 per cent. of the gas sold, 83 per cent. use less than 50 per cent. of the gas sold, and looking at the table from the point of large users, we see that 17 per cent. of the consumers are using 50 per cent. of all the gas sold and 10 per cent. of the consumers are using 37 per cent. of all the gas sold. I can see no reason why we cannot expect the same effect on gas consumers that has been realized from electric consumers. The company above referred to also made an analysis of their costs for 1 year, separating the costs into those occasioned by quantity of gas made, those resulting from number of meters and consumers connected, and those expenses occasioned by the operation of the plant, this latter expense being regardless of the amount of gas sold or meters and consumers supplied. By applying the table of consumers' sales against the one showing costs, they arrived at a point where cost of supplying consumers and cost of making and distributing the gas equalled or exceeded the amount received for the same. For obvious reasons, I have omitted the publishing of this table of costs in this paper, but some of the results shown may be briefly stated. The table brought out the startling fact that 19 per cent. of all consumers did not pay their output and consumer costs, that 34 per cent. did not pay their manufacturing, meter and demand costs, and that only 34 per cent. paid all the costs they occasioned, or that this 34 per cent. paid enough in excess of a reasonable amount to enable the company to make good its loss on the unprofitable consumers. This leads to but one conclusion, that they are doing business with a great many consumers that are losing them money each month, and that they are selling them a very small quantity of gas, and from the other end of the table they found that from the comparatively few consumers who were using a large percentage of gas they were making a very large profit after paying all costs. Surely this is the end of the business to cultivate, and consumers of this class can be taken on at a rate lower than our average cost, and still be made to yield a goodly profit after paying all the costs for investment, meter expense and cost of gas consumed. This will bring about largely increased sales and net earning, and would also decrease our cost of gas per 1,000, as the fixed expenses will be but slightly increased. The consumer expense would be increased only if additional consumers were taken on, and not at all if the sales to present consumers were increased. The conditions shown by these tables are not exceptional cases, but represent the condition in many gas plants. Several other gas companies have analyzed their consumers in the same way and found about the same conditions. To make this clear, we must bear in mind that meter and consumer expenses are increased or decreased as the number connected is increased or decreased, that output expenses are increased or decreased as the sales of gas increase or decrease, and that capacity charges are fixed largely by the general plan of taking on business, by the maximum demand, and by expenses beyond the management's control. If then the gas company can make its rates based upon its actual cost for the three distinct subdivisions of expense, it has reached ideal conditions and may know its true costs and profits, and can intelligently direct its efforts to increase its business from sources that will show a distinct profit and avoid the taking on or attempting to secure sales of gas or accommodation consumers that can only add to our loss. Some will argue that the gas company as a public service corporation cannot refuse to supply this latter class of users. That may be true, but we need not strive for that kind of consumers, and blind ourselves in the belief that because we have added a great many meters to our service we have necessarily increased our sales and profits. If we adopt a service charge for each consumer, basing this charge on the cost of consumer and meter expenses and proportion of capacity expense, we can sell all our gas at a profit and sell it at a price that will cultivate additional sales and add expense only in our output costs.

Proposed Application of this System of Charging in One City.—The city to which I refer is now getting gas for illuminating purposes at $1.25 per 1,000 cubic feet, and at $1 per 1,000 cubic feet for fuel purposes. The average receipts of this company are approximately $1.10 per 1,000 cubic feet. They cannot believe that any marked increase in consumption would result from any horizontal reduction in price that it is within the power of the company to make. In view of the fact that they know that they have a great many unprofitable consumers, they believe such a horizontal reduction inequitable to the degree of being dishonest. They think a large portion of these consumers are not entitled to any reduction, and a reduction to them can only be made to the marked disadvantage of their profitable consumers, and they believe that all the reductions they can make should be given to those consumers who are profitable, and these reductions, and future reductions, should be given to those consumers in their degree of profitableness. They, therefore, propose, if they can secure the consent of all

interested parties, to put in vogue an optional system of charging whereby any of their consumers can buy gas by paying $12 per consumer per year, plus $15 per 100 feet of maximum demaud, plus 60 cents per 1,000 cubic feet for gas. If they had no unprofitable consumers, they could supply their profitable consumers on a highly profitable basis at these charges. The inauguration of this system of charging will be equivalent to a reduction of about 5 cents per 1,000 cubic feet on the entire sales, and yet I believe this reduction will make it possible to command a large field of fuel gas and greatly encourage increased sales of gas to many of the present commercial and domestic users. It is also believed that this new field opened up can be developed to an extent which will soon make it possible for them to make further reductions in their charges on this basis, opening up other fields for the sales of gas, and that they can gradually increase their sales without correspondingly increasing their expenses, and continue to approach more closely their manufacturing expenses until the gas output will be several times more on a per capita basis compared with the results now being secured by average gas companies.

References in Connection with the Preparation of this Paper.—To those who care to give this subject further study, I suggest you read the following papers, which I have carefully analyzed in preparing this discussion and to which I wish to acknowledge due credit: "The Wright Demand System," by Arthur Wright, a paper read before the National Electric Light Association in May, 1897; "Uniform, Equitable and Competitive Charges," a paper read bp Henry L. Doherty at the May, 1900, Convention of the National Electric Light Association; "The Four C Systems," a paper read by L. R. Wallace before the National Electric Light Association in May, 1901; a joint discussion on "Rates," by Louis F. Ferguson, L. R. Wallace, Ralph J. Patterson, Samuel Scoville, E. F. Phillips and Henry L. Doherty, before the National Electric Light Association in May, 1902; a paper on "Rates," by Henry L. Doherty, before the Northwestern Electrical Association, January, 1901; a paper entitled "Equity, Legality and Advisability of Charging Different Rates for Illuminating and Fuel Gas," by Henry L. Doherty, before the Ohio Gas Light Association in March, 1902, and a contributed discussion on this same subject at this convention by Mr. Emerson McMillin and Mr. Paul Doty.

Plan for Fixing Maximum Demand.—The original plan in adopting this method of charging to the electric consumer involved the use of an interrupting device so that the consumer could not exceed the maximum demand he paid for. As yet no suitable maximum demand instrument has been secured. Different devices have been planned and are in limited use. One concern makes an instrument which is a magazine of fuses, and as fast as one fuse blows the contact point moves over to the next fuse, with a sufficient time factor to allow the consumer to curtail his demand. Another instrument, known as the Lacey controller, interrupts the current by the use of a series of shunt magnets. Several devices of this sort are now on the market, but none are satisfactory on inductive loads. In most cases the consumer pays on his total installation or on an arbitrary demand mutually agreed to between the consumer and the company. No serious trouble has occurred with consumers whether interrupting device is used, a charge made for the entire installation, or an arbitrary demand agreed upon. Plans are now out for a device for limiting the maximum demand of the gas consumer, but no device has been built and experimented with. If this method of charging is adopted by the company referred to above, the charges will be made on the basis of the meter installed on the consumer's premises at the time the system is put in vogue. Adjustments will then be secured by the use of a "Glass" complaint meter to determine the maximum demand of each consumer.

Legality of Proposed Method.—The question has been asked many times as to the legality of this method of charging for gas or electricity. I will not take time in this paper to give you the opinions expressed, but will say that the plan has been submitted to many of the ablest attorneys in both East and West, and in every case they have stated that they felt a company could establish the rate and have it upheld by any court unprejudiced by local feeling. Some will argue that because their State or city laws prohibit a meter rental charge they could not adopt such a plan. This may be true in some cases, but the writer believes that the gas men are largely to blame for the final passage of these laws by ignorance of their true costs and their consequent failure to convince the courts that certain classes of consumers are unprofitable and the losses from their business must be made up by high rates charged to the profitable consumers, which the court would see was unjust. A company prohibited by ordinance from charging to exceed a certain rate would find it impossible to put all consumers on this basis, but when they are considering a reduction in the price of gas by charging a service charge and a lower rate for gas, they make a reduction to those consumers who are profitable and attract others to use gas at a low rate. This plan would prevent the already unprofitable consumer from making a further loss to the company and will prevent consumers who are now slighily profitable being put in the unprofitable column. Would the public accept such a plan, or is it practical? We can answer from the experience of the electric companies that it is proving highly satisfactory. It has increased their sales to present consumers, it has brought new long hour burning consumers, it has popularized brilliantly lighted stores, shops and homes, it has increased net earnings, it has kept away unprofitable business and ruined an opposition company that charged meter rates without a minimum or service charge. The using consumers will welcome it and profit will result; the accommodation and non-using consumers will shun it and grumble and save the gas company money by doing without its service.

In conclusion, I suggest that the gas companies go carefully over their various classes of consumers, and into the separation of their costs under the divisions outlined above and see the conditions under which they are now operating. If they find it to be the case, is it not advisable to adopt a service charge, at least on the new consumers, and in the fixing of rates in future?

[Continued from Page 650.]

PROCEEDINGS, TWELFTH ANNUAL MEETING MICHIGAN GAS ASSOCIATION.

HELD IN JACKSON, MICH., SEPT. 21 AND 22, 1904.

SECOND DAY—AFTERNOON SESSION.

The proceedings for the afternoon of the second day were opened by the reading of the paper by Mr. G. C. Turner, of Coldwater, Mich., on

RETORT HOUSE PRACTICE IN A SMALL WORKS.

[For the text of Mr. Turner's paper, see JOURNAL, Oct. 3, 1904; p. 524.]

Discussion.

Mr. Schaddelee—I think the reported results obtained are very acceptable. Mr. Turner is certainly very fortunate in having stokers who keep the gas house running in such good condition under the practice stated; but I don't see how he figures his cost of labor on a make of 55,000 cubic feet per day. This at the rate of $6 per day for retort house labor would be over 10 cents per 1,000 cubic feet of gas made. I don't see any mention about the purifying boxes; perhaps the stokers take care of them.

Mr. Cobb—Those figures are for labor in the retort house alone?

Mr. Turner—Each of our stokers gets $12 per week; the helpers $10 per week. Adding to these wages 1 hour's time of the street foreman each day, it brings the cost of retort house labor to a fraction over 9 cents per 1,000 cubic feet of gas made.

Mr. Douglas—I take exception to Mr. Turner's statement that it is difficult to keep the proportion of sales of coke in the smaller town up to the consumption of gas. It is easy to keep up the sale of coke in any place where they can keep up the sale of gas, especially in the smaller towns.

Mr. Turner—Up to this year we have always had more demand for coke than we could supply, but if the consumption of gas increases the way it has in the past, as the only call we have for coke is for furnaces, it seems to me we must finally reach a point where there would not be a sufficient demand for the entire output.

Mr. Butterworth—I will take issue with Mr. Turner in the statement that the money of the company is made or lost in the retort house. I think, other things being equal, the gas companies with an experienced manager in retort houses make more money. The money is mostly lost in the market for gas. I am at a loss to understand, referring to the table, why it requires 403 pounds of bench fuel to run the bench which has been in use but 10 days, while the one in use 20 months gets along with 353 pounds per ton of coal carbonized. When he speaks of clinkering the fires at 4 o'clock in the afternoon and 10 o'clock in the morning, it would be better to break the fires down as near as possible at 8 in the forenoon and 5 in the afternoon. When it comes to suddenly increasing the output of gas in small or large works with coal gas, it seems to me 3-hour charges should be resorted to.

Mr. Turner—The reason the bench in question required so much fuel was that it had been in use but a few days and the dampers in the flues had not been properly adjusted. A little later it was operated with as little fuel as the others. Regarding the clinkering it might be better to

have the hours for doing so farther apart. The hours mentioned were chosen because the 3 benches are charged and the fires freshly built at 6 A.M. and at noon, so that at 10 A.M. and at 4 P.M. the charges are nearly burned out. By allowing the fires to burn down slightly a good opportunity to clinker is afforded. The stokers have really used their own judgment in this respect.

Mr. Barthold—I think the results obtained are very good indeed. Many recuperative benches require more fuel per ton of coal carbonized. I know half depth benches of 6's cannot be operated for anything less than 480 pounds.

Mr. Amsden—I would like to ask whether the firebox is more injured by the use of coke or soft coal?

Mr. Turner—I have never been able to make a test. Our plant is right in the business section so we cannot use soft coal, but I presume coke would burn out the sides a little more than soft coal. We have had one bench in operation 21 months now, but the firebox is not burned out a great deal, probably 3 or 4 inches on each side. I have no doubt coke burns them out a little more. I took 1 bushel of coke just after it was quenched and found it 10 per cent. heavier than dry coke, so the weight of this bench fuel was figured in at 10 per cent. less than it actually weighed.

The Association then listened to the following

REPORT FROM COMMITTEE ON NOMINATIONS.

JACKSON, Sept. 21, 1904.

To the Michigan Gas Association: Your Committee on Nominations beg leave to nominate the following gentlemen as officers of this Association for the ensuing year:

For President—Mr. E. F. Lloyd, Detroit, Mich.
" *Vice-President*—Mr. W. H. Barthold, Saginaw, Mich.
" *Sec'y. and Treas.*—Mr. H. W. Douglas, Ann Arbor, Mich.

Respectfully submitted, F. E. SHERIFF, JOHN HELLEN, A. L. ZWISLER, } Committee.

On motion the report was accepted and the Secretary was instructed to cast the ballot of the Association in favor of the election to office of the gentlemen named.

The committee on naming time and place for the next meeting recommended September and Detroit, respectively. The report was adopted.

The following

REPORT OF THE COMMITTEE ON PRESIDENT'S ADDRESS

was handed in:

Your committee commend the President's address for its practical good sense and its useful suggestions. We believe it correctly reflects the sentiment of our membership that, while any eligible person who may desire to join our Association is welcome as a new member, wherever he may reside, yet our active efforts to secure new members should be confined to the State of Michigan and territory immediately adjacent thereto, especially in view of the proposed plan for uniting all the Gas Associations of the country in some scheme for co-operative work.

We also approve the idea, expressed in the address, that all members of the Association should be expected to do some work in its behalf, and that associate members should be heard from to a greater extent than heretofore.

We especially indorse our President's plan for straightforward and truthful advertising; and in this connection we recommend that his suggestion, as to a proposed co-operative advertising bureau, to be maintained and patronized by all the gas companies represented in this Association, be further discussed by this meeting before its adjournment.

We also recommend that the President's suggestion as to the appointment of a committee, at this meeting, to secure if possible the co-operation of Michigan gas companies in the adoption of standard sizes and nomenclature of coke, be carried out. Respectfully submitted,

IRVIN BUTTERWORTH, WM. H. FROST, J. C. STIRLING, } Committee.

The report was adopted and that portion in reference to co-operation and advertising was referred to a committee, consisting of the President and Secretary elect, the matter to be taken up by the correspondence method.

THE REPORT FROM THE COMMITTEE ON SCHOLARSHIP

was as follows:

Your Committee on Scholarship feel that the work on naphthaline now under way is of such an important nature that it should have the support of every gas company in the State, and that every assistance possible, in the way of data and material, should be given.

It is not the aim of the scholarship to turn out each year a finished, practical gas man, but to carry on a course of research work, which we hope may in turn be of benefit to every gas company and at the same time give to the holder such a training in accurate scientific work as is so necessary to the gas engineer.

We recommend that the work the coming year be given as near as possible a practical nature.

Sufficient funds being now on hand to carry on the work another year, we advise that no further subscriptions be asked for until our next meeting.

The question of establishing a preliminary scholarship in the University of Michigan, giving the holder 2 years' work in the line of gas engineering, was considered and the matter (on motion) was referred to the Committee on Scholarship for the year.

To be Concluded.

Breaches of Trust by Employees.[1]

The question of how far to extend his confidence to his employees is one that must at times engage the attention of the business man, as matters arise or processes are adopted which permit of no betrayal. He may have only a stenographer or a few clerks, or he may have hundreds of people in his employ, in his office and in his works. In any case, there are times when the betrayal of a business secret by a stenographer or clerk or a trade secret by a foreman or workman in the shop may mean the direct or indirect loss of a great deal of money. In this connection it is interesting to note recent instances where an employer of labor has had to ask the courts to intervene in his behalf to compel by injunction an employee to maintain the confidence that was reposed in him.

Under the important subject of master and servant the laws of the United States and England provide that an employer, the master, has the right to expect honorable treatment from the employee, the servant, in the matter of confidences. The contract made when a man or woman enters employment implies, so the law provides, that the master's secrets be kept. There are rascals in every calling, who would like nothing better than to betray the secrets of a former employer in order to ingratiate themselves with a new employer. The clerk who has access to the order book may provide a competitor of the recent employer with a valuable list of names. Or it may be a private schedule of costs or of prices and discounts.

The betrayal of business secrets is often a serious matter. The modern business man cannot look after details himself. He has not the time. He has to trust his people. If the business is comparatively small, the managing officers may keep private books, which are supposed never to fall under the eye of employees, and they may themselves attend to correspondence, doing the work with pen and ink, or upon the typewriter, which latter accomplishment has been acquired by many men for this particular purpose. Yet if there be an inquisitive employee about the place he or she is apt to know a good deal more than the employer realizes, and if the inquisitive one is of the kind of stuff that would permit betrayal of knowledge obtained in such a manner the opportunity may offer in a new employment.

Few business men realize that they have protection under the law if they wish to avail themselves of it. A recent English case affords an excellent illustration of this right, and as it is brought under the laws of equity the same general principles apply in the United States. The question at issue was whether an employer has the power to protect himself against a breach of confidence on the part of his workmen. The plaintiff had employed a man named Marsh as correspondence clerk, who afterward went to one Turner who was in the same line of business. The plaintiff alleged that Marsh communicated to Turner the names of certain customers, and prayed for an injunction restraining Turner from acting on, and Marsh from giving, such information. Turner in his defense stated that Marsh had only suggested these names, and when he learned that the persons named were customers of the plaintiff he dismissed Marsh from his employ. The Court granted the injunction.

In another case, one Robb employed one Green, who, intending to set up in the same line of business, copied the names and addresses from Robb's order book, and when he had begun business used the

1. *Iron Age.*

names ef these customers to get trade. The Court issued an injunction restraining Green from using the names, stating: "It is good law that a servant having left his master may, unless restrained by contract, lawfully set up in the same line of business as his late master, and in the same locality; and that he may, without fear of legal consequences, canvass for the custom of his late master's customers, whose names and addresses he has learned *bona fide* accidentally during the period of his service. But here we are dealing with a flagrant breach of trust during service, with intent to reap the advantage contemplated afterward. In such a case, too, it seems to me that the fraud in service with intent to use afterward, and the use afterward, are both discountenanced by law."

Another eminent judge, dealing with the question of trade secrets, has decided: "There is no doubt whatever that where a party who has a secret in trade employs persons under a contract express or implied, or under a duty expressed or implied, those persons cannot gain a secret and then set it up against the employer."

An eminent authority on this branch of the law states that "where an employer has machinery invented by him, but the nature of which and peculiarity of which he desires to keep secret, and of which desire on the part of the master the servant has notice at the time of his employment, even in the absence of an express contract on the part of the servant, the relations will be deemed confidential, and the law will imply a promise to keep his master's secrets thus committed to him, and any attempt on his part to use the secret for his own interests against his master, or to communicate to others or in any manner to aid others using it, will be a breach of his contract with his master, which will be enjoined by a court of equity." Probably the law would be useless in most cases, because the employer either does not learn the harm that a former employee is doing him, or else, while he may be morally certain that secrets of his business are being revealed to a competitor, he cannot prove it. Yet the law exists, and were it more generally known doubtless it would be more often used. The English laws go farther than the action in equity, in a provision of the factory laws, which provides that the betrayal of a trade secret on the part of an employee is a misdemeanor, punishable by fine not exceeding £10, it making no difference whether the secret is furnished directly to the employee in question or to a fellow workman; and the same punishment may be meted out to the man who solicits such information from a workman. No such specific provision is made in this country. The workman may be enjoined, and under certain conditions he may be made liable for damages, but he is generally not financially responsible, and damages would mean little more than the name.

Fortunately, such instances of extreme breach of confidence are comparatively rare. But where an employee goes from one employer to another he is pretty apt to take with him all that he can in the way of knowledge of the business, that his services may be made as valuable as possible in his new position. Generally this may be done with complete honesty, the knowledge obtained and given being a legitimate part of a trade or occupation. The other sort of thing, the peddling of business and manufacturing secrets, occurs occasionally, and the real safeguard is not the law, but extreme care in selecting employees for positions of trust. The law is useful only as a last resort.

A Review of the Thirty-second Annual Meeting of the American Gas Light Association.

[Communicated by Mr. Frederic Egner.]

The "Special Editorial Correspondence" relating to the recent meeting at Washington of the American Gas Light Association, being a synopsis of the proceedings, the writer will try to avoid repetition, and for the benefit of many readers of the Journal who were not there will amplify the earlier information by going over the same ground, but by a different method.

When it is admitted that the attendance was large and representative in character; that the business was conducted in the usual smooth and masterly manner; that the papers presented were creditable to their authors; the discussion of same spirited and well sustained, and that everybody had a pleasant time then about all that could be said that is favorable has been stated.

But if we inquire into practical results and ask what progress has been made in the furthering the knowledge of the gas industry the answer must be somewhat disappointing.

Here we have a large number of gas men, leaders in the profession of the art of making, distributing and selling gas, some of whom have travelled over 1,000 miles, most of them over several hundreds of miles, expending considerable money to defray the expense connected with such attendance, not considering the loss of time and inconvenience at best of travelling, sitting together in a close room and listening to long reports from the Secretary, Treasurer, and Trustees of the Gas Educational Fund, and The Committee on Research, which in the end made it necessary to curtail discussion of papers read; actually cutting out two of the papers altogether, and taking them "as read" with scarcely any discussion at all. Now that sort of treatment of a paper is very discouraging to the writer, and when, as was the case in this instance, the papers are really good ones and "full of meat," it is to say the least disappointing to the members of the Association as well, and is a distinct loss to all.

Right here let me say that the preceding statements must not be misunderstood and thus cast any reflection upon the able conduct of President Rollin Norris. That gentleman did all in his power to give the fullest latitude to all who wished to speak on the subjects presented. If anything it is the fault of Council after Council of the Association in not acting upon the suggestions repeatedly made to have the various reports mentioned printed before ths date of meeting and forwarded to the members in like manner as the papers which are to be read. The reports are both necessary and interesting, especially those of the Trustees of the Gas Educational Fund and the Committee on Research, but it is herewith submitted to the readers of the Journal, who are members of the American Gas Light Association, if it were not much better, and conducive to the interest of the Association in every respect, to dispose of the reports mentioned in the manner indicated, instead of having the reading of them at the meeting take up the time of the convention whose aggregate cost to get together is considerably over $10,000 every year. In connection with the last statement the reader will kindly bear in mind that there were (according to report) over 200 members present, many of whom also brought their wives and daughters. The writer, who has attended many meetings of the American, Western, New England and other home and foreign Associations, can say that at not one of these has he observed any superiority in carrying out the set programme of the meetings over the one just passed. It is the system that is at fault and not any individual, that there is such a waste of time as, in the opinion of the writer, was in evidence at the recent meeting of the American Gas Light Association. At no other meeting was closer attention given to the reading of papers, reports or discussions, or fewer absentees from the meeting hall, than at the meeting now under review. At no time in the previous history of the Association did the members respond more promptly to the call of its President at the hour of calling the meeting to order; neither was the set time for the sessions at all curtailed. If anything, it was quite the other way, at the end of two of the sessions at least, and yet, for lack of time, the very interesting paper by Mr. W. A. Baehr, of St. Louis, Mo., was "taken as read," and practically not discussed at all, certainly not as it would have been but for the want of time; while the instructive paper by Mr. W. B. Calkins, also of St. Louis, was neither read nor discussed, and altogether for the same reason just stated. But that is not all. One motion at least, intended to promote the efficiency for work of the Association, could not even be mentioned, much to the expressed regret of President Norris, and as it was self-evident that there was no time for it, the maker most cheerfully withdrew it as though never offered. It is to be hoped that the present Council of the Association will attempt to make a repetition of these unpleasant and unprofitable features of a meeting an impossibility at future gatherings of the American Gas Light Association. As the writer offers thes criticisms with no offensive intent, it is hoped that the suggestion may be received in a kindly spirit by those whom it may concern. As for the facts, *they* speak or *have spoken* for themselves at the meeting.

A few words concerning the papers read at this latest and at some of the previous meetings. As to the earlier meetings, the report of the "Committee on Award of the Beal Medal" will convey a subject for thought. The report was to the effect that these gentlemen considered none of the papers previously read as warranting the granting of the Beal Medal, and that statement will bring us to a short consideration of the papers read or taken as read at the most recent of our conventions; though as for that, as they have been or will be published in the Journal, the reader can form his own conclusions. "*The*" paper of the meeting from my point of view, was that of Mr. B. H. Spangenberg, of Philadelphia, on "Consumers' Meters," although the author of it did not get "a rising vote of thanks" as was accorded to Mr. E. H. Earnshaw, also of Philadelphia, for his paper on "Oxide Purification." The first point of merit of Mr. Spangenberg's paper, as viewed by the writer of this article, was that it treated a comparatively original sub-

ject in an original and thoroughly masterly manner, bringing on a discussion of such length and interest as has been unequalled in the history of the Association.

It was participated in by 18 members, including the leaders in the profession of making gas meters, headed by that respected Dean, Mr. John McIlhenny, of Philadelphia, who was followed, in the order named, by Mr. Wm. McDonald, of Albany, John Gribbel, of Philadelphia, Chas. H. Dickey, of Baltimore, and John D. McIlhenny whose telling speech had finally to be cut short as the hour for recess had been long since passed. But the discussion was resumed after re-assembling, when several others, notably Mr. H. L. Doherty, spoke on the same issue before Mr. Spangenberg was called on for the closing remarks. It may be here stated that while Mr. Spangenberg's paper was somewhat of a startling nature, and his figures most interesting, and the whole paper most meritorious, whatever the custodians of the Beal Medal may think of it, after the meter men had *their* say, it left the whole matter in still considerable doubt, and doubt of a kind which only further effort on part of the investigators *and a considerable lapse of time* can satisfactorily solve While Mr. Spangenberg's statements were of a convincing sort, not one of the gas meter manufacturers but put holes in them from their point of view, and in which many members unhesitatingly agreed. The paper on "Oxide Purification," while well put together and honored, as previously mentioned, by a rising vote of thanks, really did not do much towards advancing the science of gas purification. It demonstrated conclusively that its author was a painstaking investigator and individually certainly knew his business; but the art of purification cannot be claimed to have been advanced, as those who really are students and have not neglected the work of the notable men in the gas profession who have preceded them, as found on the records of Associations and earlier publications, can easily verify if they will only take a little time and trouble. And by the way, doing so by the younger and rising generation would often result in the saving of a good many dollars to their employers, and trouble to themselves—maybe.

This latter point was happily brought out in the discussion of the paper on "Generation of Steam by Waste Heat from Water Gas Sets," by Mr. Donald McDonald, of Louisville, Ky., and Mr. A. B. Macbeth, of Kansas City, Mo., when Mr. Alten S. Miller, seconded by Mr. A. G. Glasgow, made the teiling point, that it formerly was considered bad practice in water gas making to produce more combustible gas in the heating up process than was required to do the work, pointing out that by watching the sight cocks and purge valve of a water gas set in operation this waste could easily be avoided and further emphasizing their remarks by generally indicating that they were of the same opinion still. To this the writer would add that but for the desire to produce a very large quantity of gas with an apparatus of a given size, there need be no waste of heat energy by following the maxims laid down as above indicated, and which were well understood by gas makers 21 years ago and are really nothing new. If a manager insists on getting 1,000,000 cubic feet of water gas out of an apparatus which could produce 750,000 cubic feet per diem without waste, *then* he can surely have his wish gratified, but at the expense of a waste of fuel. Then, if it be more economical to make less gas per square foot of area occupied by the generating apparatus, or more by forcing this apparatus beyond its capacity for good work, and compensate for this by adding "economizing" apparatus of some sort or other, *that* is a subject we may hope to hear about further on part of President Norris, who confessed himself an advocate, or at least a believer in, the newer method. Mr. F. W. Frueauff's (Denver) paper on "Methods of Charging for Gas" indicated that the writer had spent much ingenious thought upon his subject, but, as he will find it quite difficult to convince a consumer of gas who may be paying $1 per 1,000 cubic feet for the article that he is an unprofitable customer, by reason of not using a good many thousands, hence ought to pay more, the probability is that the Courts will be called on to decide the question in the end, with the chances against the gas company.

According to one rendering of Mr. Frueauff's arguments, electric companies generally are *now* charging for current in the manner indicated by him, but that is very far from the fact as yet.

As informed at the meeting by a gentleman of unquestioned ability and authority on such subjects, this method of charging for the electric current is very likely to be brought before the courts of a certain State before long; and the decision will no doubt be looked for, now that we have had Mr. Frueauff's excellent paper, with more than usual interest. In conclusion, the writer will beg leave to say that he thinks it is a great pity that the proceedings of the American Gas Light Association are not published verbatim in the JOURNALS, as in former years, and as is still being done by other gas associations. Surely, if the American Gas Light Association can be generous and progressive enough to very materially assist the Gas Educational Fund, both by financial, moral and sentimental support, no *good*, valid argument can be brought against the former practice of having the technical JOURNALS undertake the prompt publication of the proceedings in their columns.

The Mueller Turkish Band.

The accompanying illustration may bring to mind a very pleasant reminiscence of the meeting at St. Louis last summer of the Western Gas Association, and it will especially appeal to those who occupied the front box in Paris, "on the Pike," during the particular evening in question. The H. Mueller Manufacturing Company, of Decatur, Ills., was responsible for the diversion, and the Sultan of the party was "One of the Mueller men." He sefuses to disclose his identity, but he is nevertheless in the picture.

The "Turks" shown are indicated as follows, the reading to be made from left to right, the top row first:

1.—Robert Mueller, Decatur, Ills.
2.—W. A. Bixby, Quincy (Ills.) Gas and Electric Company.
3.—P. T. Hawes, H. Mueller Mfg. Co.
4.—Mark Dean, Central Foundry Co., New York city.
5.—J. A. Reilly, Queen City Coal Co., Cincinnati.
6.—A. P. Ruud, Rund Mfg. Co., Pittsburg, Pa.
7.—Howard Bixby, Quincy (Ills.) Gas and Electric Company.
8.—F. W. Bedard, Citizens Lighting Company, La Salle, Ills.
9.—Oscar B. Mueller, Decatur, Ills.
10.—Mark Leavenworth, Ruud Mfg. Co., St. Louis, Mo.

Mixed Gas for the Generation of Electricity.[1]

Report by Mr. E. J. WELLENS, of Hebden Bridge.

A short time ago, Mr. E. J. Wellens, the Engineer and Manager of the Hebden Bridge and Mytholmroyd Gas Board, received instructions to report to the Board on the subject of the manufacture of power gas for the supply of the electricity station at Hebden Bridge, with the view of meeting the demand in the district. The matter had previously been under consideration—prior, however, to the appointment of Mr. Wellens—and an arrangement was made for utilizing the carburetted water gas plant for the manufacture of this gas, and delivering it through a special main to the electricity station at the price of 6d. per 1,000 cubic feet. All the other gas engines in the district were also to be supplied. This arrangement was not approved of by Mr. Wellens, as, in the first place, he could not spare the plant for the purpose; and, secondly, he could not produce the gas at the price fixed. It was then decided to supply ordinary coal gas and carburetted water gas at 1s. 9d. per 1,000 cubic feet; and a 12-inch main was laid for the purpose, with one of Braddock's 1,500-light dry meters. This arrangement we understand is giving satisfaction. There is no pulsation on the street mains, and the 300-horse power Campbell gas engine is running during lighting hours—that is to say, from 5 o'clock in the afternoon.

At the outset of his report, Mr. Wellens pointed out that the information at his disposal was very vague, and might be taken only as

1. *Journal of Gas Lighting.*

an estimate, because the Electricity Committee could not give him any idea as to the quantity of gas they would require during the 12 months. This made comparison out of the question. He therefore dealt with existing conditions, and made the following remarks thereon:

The first point which appears to my mind is this: We have 64 gas engines in the district; and taking into consideration the quantity of power gas that the electricity works will take, shall we benefit by introducing the new gas and taking them off the coal gas, when we are depending so much on them creating a day load, and the gas used for this purpose last year was 8,237,000 cubic feet? Can we produce gas sufficiently cheap here to come in at a less rate than any firm with a large gas engine can produce it themselves?

Our conditions at present, you are aware, are very unsettled, through the Railway Company, and through our plant being generally too small for the consumption in winter. We have, of course, the carburetted water gas plant, which I quite admit is standing 8 months out of the 12. But it is what we have to depend upon during the winter months, when the demand is greater, as the reason of it being put down was that it was absolutely necessary in winter to meet our present conditions. We have to overhaul it every summer to make sure of it being in order for winter, because it is not duplicated; and if anything happened to it when we are working it, we should be in difficulties. So if we desire to make further use of the plant, we ought to have it duplicated. This is what must be done if we entertain the idea of another quality of gas. Another reason is that we cannot with advantage give a large percentage mixture of carburetted water gas and coal gas, because we make such a small quantity of the latter during the 8 months of the year that it would not pay to work the carburetted water gas plant to give this gas for the mixture. Again, our gas going right to the town as produced does not give us sufficient control over it to guarantee the gas being up to standard and of uniform quality. We make 100,000 cubic feet of carburetted water gas per 12 hours when working, and have only storage in the relief holder for 20,000 cubic feet. This would compel us to be making at least about 15,000 cubic feet of coal gas per hour to the 8,000 cubic feet of water gas; and it is only from October to February that we make anything like this quantity. During August we only require 8,000 cubic feet per hour for the town's supply.

Mr. Wellens next called the attention of the Board to the fact that their carburetted water gas plant was not constructed to generate blue water gas economically; and for making a power gas of about 260 B.T.U., or half the calorific value of coal gas, they would require an extra generator. He had been in communication with the makers of the plant (Messrs. Humphreys & Glasgow) on the subject, and they had replied that the installation of a generator only for the production of a simple blue water gas would be most ill advised, as, taking into account the number of thermal units it delivers per cubic foot, it would be anything but cheap, neither was it a fit power gas for engines, owing to its liability to premature ignition "racking the engine, and causing excessive wear, etc., in the cylinders." Their estimate for duplicating the generating plant was upwards of £1,000. Mr. Wellens went on to say that there was another water gas generator—the Dellwik-Fleischer plant—used for making a power gas, which was being adopted in many gas works, and was supposed to compete fairly well with the producer or suction plant, which, if installed at Hebden Bridge, would also cost £1,000, without taking into consideration the gasholder and storage. With regard to suction producers, Mr. Wellens pointed out that the gas generated has only about half the calorific value of blue water gas, or from 160 to 180 B.T.U. He concluded by placing before the Board another matter which he thought would meet their circumstances much better—viz., to try the present system of coal gas and carburetted water gas to meet the difficulty, and produce a gas of lower illuminating power and calorific value, which could be done at less cost.

Mr. Wellens closed his report by pointing out that the Board's Act stipulates that they are to supply 15-candle gas. Why, then, he asks, should they supply 18 candle, as they do at the present time? The Board are face to face with heavy expenditure if they adapt themselves to maintaining the manufacture of high quality gas; and so long as incandescent lighting is rapidly coming to the front, gas of 15-candle power, or even lower, will give practically the same value to the consumer. Having quoted the remarks of Mr. H. E. Jones, in his Inaugural Address to the Institution of Gas Engineers, on the advisability of supplying gas of low illuminating power at a cheap rate, Mr. Wellens said:

I can now only urge the advisability of this better method, which will then allow us to utilize our present mains instead of duplicating all over the district. With regard to the particular case of the electricity works, I am convinced that they will continue the use of coal gas and carburetted water gas. While it may be a little more expensive per 1,000 cubic feet compared with the suction plant, I am convinced it would give entire satisfaction all round, alike for cleanliness, less wear and tear on their engines, less capital. There would be no responsibility beyond turning a valve. We have spent a large sum in mains, and they in return have bought a meter, both of which will be practically useless if they discontinue the use of coal gas. The estimates of the manufacturing charges per 1,000 cubic feet are: Our present carburetted water gas 7.5d. to 8d.; the Dellwik-Fleischer system, 5d. to 6d.; Dowson or Mond gas, 4d. to 5d.; suction gas (Tangye's system), 2d. to 3d.; coal gas of 14 to 15-candle power, 10d. to 11d.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE "Publication Department" of the C. W. Hunt Company, West New Brighton, N. Y., writes us to the following effect: "The C. W. Hunt Company, of West New Brighton, N. Y., has been particularly successful at the World's Fair, two of its three exhibits securing highest awards, the third not entered. The Hunt Industrial Railway received the gold medal for narrow gauge railways, and the electric storage battery locomotive built by that Company received the silver medal, being the highest award for this type of locomotive."

THE executive office of the Worcester County Gas Company is located in the Board of Trade Building, No. 131 State street, Boston, Mass. The President of the "County Company" is Mr. Alfred Clarke; his *alter ego* is Mr. Addis M. Whitney, Treasurer. Mr. Clarke's way of telling one that he is, according to Mr. Clarke's thought, mistaken is here shown—the Clarke way of doing some things is to hand under date of the 29th ult. "The *positive statement*, contained in your issue of Oct. 17, 1904, on page 612, as follows, 'The Worcester County (Mass.) Gas Company has virtually decided not to compete for the gas supply of Palmer, Mass.,' is absolutely untrue and without foundation in fact. See Springfield *Republican*, October the 7th." Mr. Clarke adds a line or so further about his loss of faith in different authorities, but as his faith in himself is evidently of the scientific order, we humbly await the advent of his Company in a practical way in the precinct named.

COL. D. B. DYER, President of the Augusta (Ga.) Gas, Electric and Street Railway properties of Augusta, has presented to the authorities of Kansas City, Mo,, the valuable collection of curios which have been on exhibition in the Kansas City Museum for the past 10 years. In the gift deed the giver specified that the colllection shall be the nucleus of a public museum, to be known as the D. B. Dyer Museum of Kansas City, and the donor declares that he will keep on adding to the collection.

ADVICES from Cincinnati, O., are to the effect that Col. James Isherwood has disposed of the Isherwood estate stock in the Lawrenceburg (Ind.) Gas and Coke Company to local capitalists. In the reorganization of the concern the officers elected were: President, G. M. Roberts; Secretary, I. Hany; Treasurer and General Manager, George Kunz. It is supposed the change means some expenditure on plant betterment account.

MR. ALLAN POLLOK has again been retained by the San Francisco (Cal.) Gas and Electric Company as General Manager. He held that position formerly but resigned in order to assume charge of the St. Francis Hotel. The reappointment seems to point the way to the fact that Mr. Pollok's means in the San Francisco Company were knowing ones.

MR. GEORGE G. RAMSDELL, of New York City, has been appointed Receiver for the properties of the Nassau County Gas Company, of Hempstead, L. I., with full authority in the premises. The appointment followed a bill of complaint filed by the E. D. Smith Company, in proceedings had before Judge Thomas, of the United States Circuit Court. A full account of the undertaking can be found in the Brooklyn *Daily Eagle*, dated the 27th ult.

THE Municipal Gas Company, of Albany, N. Y., has declared its regular quarterly dividend of 2½ per cent. It was made payable the 1st inst.

MESSRS. THOMAS EVANS & SON have been appointed local managers in Connecticut for the Ætna Indemnity Company, succeeding Messrs.

Rowley and Fisher. The Evans firm will have its headquarters in Hartford, and its senior member was for years the well known and well respected Secretary of the Hartford City Gas Light Company. His son and partner, Mr. John D. Evans, who is a graduate of Trinity College, Hartford, was in the employ of the Hartford Company for a short time, and is a nephew of Col. John P. Harbison.

MESSRS. SULLIVAN BROTHERS, of Flushing, N. Y., inform us that they are busily engaged on the main extensions recently planned by the Queens Borough Gas and Electric Company, from Far Rockaway to East Lynbrook, East Rockaway and Rockville Center. The work is progressing at the rate of about a mile per week.

MR. JOHN SOMERFIELD BRAYTON, for 50 years a prominent and respected resident of Fall River, Mass., died at his home in that city the morning of October 30th. He had been prominent for many years in the development of the Fall River Gas Works Company. He was in his 78th year.

ADVICES by way of Trenton, N. J., dated October 28th, are to the effect that suit has been commenced, in the New Jersey Court of Chancery, by the Railway Advertising Company of West Virginia, against the Kern Incandescent Gas Light Company of Jersey City, alleging that the concern is insolvent and asking for the appointment of a receiver.

THE proprietors of the Louisiana (Mo.) Gas and Electric Light Company have filed a statement with the State authorities announcing that its capital stock has been increased to $100,000, from $50,000.

THE project for the taking over of the plant of the Windsor (Ont.) Gas Company for operation on municipal account seems to be assuming definite shape.

AT the annual meeting of the Mansfield (O.) Gas Light Company and the Mansfield Light and Power Company no change was made in the executive management. Secretary and Treasurer Hedges reported that the business of the two concerns was growing at a rate which could not be other than satisfactory to the proprietors.

FOR the last fiscal year of the Knoxville (Tenn.) Gas Company, according to the annual statement of its officers, the sum of $2,268.02 was paid into the city treasury, which sum represents a franchise tax of 3 per cent. on the Company's gross receipts for the year.

A GOLD medal has been awarded to the New Inverted Incandescent Gas Lamp Company for the working examples of the lamps shown at the St. Louis World's Fair.

THE proprietors of the Peoples Gas Light Company, of Rutland, Vt., have instituted a minimum charge of 75 cents per month for each meter in use, the prompt payment rebate (10 per cent. within 15 days) to rule as in the case of larger consumers.

THE voters of Fredericksburg, Va., will shortly be called upon to accept or reject a resolution recently adopted by the City Council that the city gas works be rebuilt, the cost thereof not to exceed $25,000.

THE charter of the Citizens Gas Company, of Minersville, Pa., has been filed with the authorities. The Company is capitalized in $20,000, and the main parties in interest are Messrs. E. L. Straub, Matthew Baddow, F. C. Bender and the Kister Bros.

A CORRESPONDENT in Boston, writing under date of October 28, says that the Board of Gas and Electric Light Commissioners has received from Mr. C. J. R. Humphreys the appraisal of the property of the various gas companies, exclusive of real estate, which are to be merged under the name of the Boston Consolidated Gas Company. Mr. Humphreys, who was designated by the Board several months ago to make this appraisal, places the value of the buildings and machinery of the concerns to be taken over at $20,276,598. A few months ago, J. Murray Howe, at the Board's request, estimated the value of the real estate of the companies at $2,782,375. The Companies are the Bay State, Boston, Brookline, Dorchester, Jamaica Plain, Massachusetts Pipe Line, Roxbury and South Boston. These estimates are in no sense binding on the Board, and the Commissioners have made this point clear. The Board simply called in Messrs. Howe and Humphreys to aid them in determining the value of the properties, as the Board needs this information in connection with the approval of an issue of stock for the absorption. The Board will give public hearings on the question of stock issue. This gas consolidation was authorized by the Legislature of 1903. The total valuation of the several Companies, exclusive of real estate, as appraised by Mr. Humphreys, is as follows: Bay State, $1,369,334; Boston Gas Company, $6,470,111; Brookline Gas Company, $5,453,655; Dorchester Gas Company, $1,436,305; Jamaica Plain Gas Company, $636,641; Massachusetts Pipe Line Company, $2,444,583; Roxbury Gas Light Company, $1,635,351; South Boston Gas Company, $830,618. Total valuation of all the Companies, $20,276,598. In his report to the Board, Engineer Humphreys says:

"Your letter of Jan. 20, 1904, directed my attention to the clause of the act under which these valuations were to be made, namely, that 'Such value shall be determined without enhancement on account of the value of franchises or earning capacity, or on account of exclusive privileges derived from rights in the public streets or of goodwill.'

"I have, therefore, made my valuation on the basis of the replacement value of said properties, and as near as possible as of the date upon which I received my instructions from the Board. For this reason I did not value the station meter in process of construction at the Commercial Point works of the Boston Gas Light Company, or the station meter in process of construction at the Bay State works. I have not included gas mains, electric lines or other construction work done in the summer.

"I have found the schedule of the properties of the Companies far from satisfactory as a basis upon which to make the appraisal called for by your Board. After the loss of much time in the endeavor to follow the arrangement of these schedules in making the valuation, I was compelled, in order to reach and present the results in a logical manner, to radically rearrange and correct the schedules and to adopt in reporting on the various properties a more uniform form than that suggested by the schedules originally. If the several companies had listed their properties in systematic manner and accompanied their schedules with plans of the items recorded, the time required for the work would have been materially shortened.

"In my valuation I have not included the following items found in some of the gas companies' schedules: Gas making materials in stock, residuals in stock, cast iron mains and fittings in stock, wrought iron pipe and fittings in stock, meters in stock, general supplies on hand, accounts receivable, notes receivable, cash on hand and taxes and insurance unexpired. My reason for not valuing these several items was that they were changing from day to day, and therefore had they been listed at different dates the result would have been of doubtful value. Street main tools being generally in use in the streets, I have not included them in my valuation. Any exceptions to thts rule are given in the reports proper. Stable equipments have been treated in like manner and for a similar reason."

MR. JOHN M. DANIELS, who since 1887 has been in charge of the works of the Columbia (So. Car.) Gas Company, has resigned the position. Mr. Daniels is practically a Columbian from his long residence there. In 1887 the United Gas Improvement Company purchased the plant and shortly afterwards Mr. Daniels assumed the management and maintained the same with credit to himself and with profit to his employers. When the U. G. I. Company sold the property to local capitalists the latter retained Mr. Daniels, and it is with regret that they accepted his resignation. He hopes to benefit his condition by means of a long sea voyage. His successor is Mr. Charles C. Hogshead, of Lynchburg, Va.

WE are informed that Col. Copley and his associates have purchased the properties of the Elgin (Ills.) American Gas Company.

THE Board of Gas and Electric Light Commissioners of Massachussets has issued an order which in effect directs the Chelsea (Mass.) Gas Light Company to put the net selling rate for gas at $1.10 per 1,000 cubic feet, a reduction of 15 cents. It was also agreed that the net price of electric light supplied on commercial account shall not exceed 16 cents per kilowatt hour. The order became effective the 1st inst. The business of the Company is seemingly in satisfactory shape.

THE Boston Board of Aldermen have petitioned the Board of Gas and Electric Light Commissioners to determine whether it would not be for the best interests of the public that the Edison Illuminating Company of Boston be ordered to reduce its selling rates. The Company does charge about all it could reasonably expect to collect.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. E. SANDERSON,
MANAGER.

PUBLISHED ON EACH MONDAY OF THE YEAR AT
No. 42 Pine Street, New York.
Telephone, 2996 John.

TERMS:

SUBSCRIPTION—Three Dollars per annum, in advance. Single copies, 10 Cents.

The JOURNAL is the official organ of the
NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.
AMERICAN GAS LIGHT ASSOCIATION.
WESTERN GAS ASSOCIATION.
OHIO GAS LIGHT ASSOCIATION.

NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, NOVEMBER 7, 1904.

The Market for Gas Securities.

The market for city gas shares last week continued to present excentric features, although in the end the trend of speculation seemed to at least favor steadiness. The closing prices in Consolidated to-day (Friday), 216⅞ to 217, being virtually even with those of a week ago. There was some good trading in it, however, by investors who buy to keep. The suggestion that holders should convert at least a part of their common stock into debentures through sale of the former and purchase of the latter did not seem to meet with great favor; nor should it. City gas bonds are readily saleable.

The Brooklyn Union Company's shares are nominally 220 to 224. The Kings county suppliers of electric currents have announced a horizontal or perpendicular or inclined plane cut in selling rates, which "cut" is not of the definite sort, although the utterers thereof say the scaling amounts to 20 per cent. or so, all round. Meanwhile, President Jordon, of the Brooklyn Union Company stoutly avers that there is nothing in the rumor that the gas and electric interests of Brooklyn are to be merged. Baltimore Consolidated is 82¼ to 82½, and Peoples, of Chicago, readily holds its recent advance.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

NOVEMBER 7.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	216⅝	217
Central Union, Bonds, 5's.	3,000,000	1,000	106½	106⅝
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan	658,000	..	108	112
Mutual	8,500,000	100	270	300
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co.. Bonds, 5's	11,000,000	1,000	108¼	108¾
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	.
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	..	..
Northern Union, Bonds, 5's.	1,250,000	1,000	104½	106½
New York and East River..				
Bonds 1st 5's	3,500,000	1,000	111	113
" 1st Con. 5's	1,500,000	..	106	108
Standard	5,000,000	100	125	130
Preferred	5,000,000	100	145	155
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	117
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	220	224
" " Bonds (5's)	15 000,000	1,000	113	115
Bay State	50,000,000	50	—	—
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works...	450,000	100	28	30
" 1st Mtg. 5's	500,000	1,000	93	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	4	4¼
" " Bonds, 5's	5,250,000	1,000	12¾	.
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas and Electric Co	29,500,000	100	10	108½
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	97½	99
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¼	89¼
Preferred	3,026,500	100	107½	109
Consumers, Toronto	2 000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	82¼	82½
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	89½	92
Consolidated G. & E. Co.'s. Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	..	50
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	361,000	1,000	75	75¼
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	88	92
" Bonds, 5's	10,500,000	..	105¼	106
Indianapolis	2,000,000	..	65	68
" Bonds, 6's	2,650,000	..	107	109
Jackson Gas Co	250,000	50	52	.
" 1st Mtg. 5's	200,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	.
Preferred	2,500,000	100	97½	100
Bonds	10,000,000	1,000	109½	110
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	136	140
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	107½	108¼
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	218½
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	4,600,000	..	105	105½
New Haven	1,000,000	25	64	70
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	108⅝	108¾
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	.
Rochester Gas & Elec. Co..	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	15,800,000	100	58½	58¾
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	94	96
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's..	2,465,000	1,000	92	93
Syracuse, N. Y.	1,975,000	100	46	48
Bonds	2,047 000	1,000	94	96
Washington, D. C	2,600,000	20	290½	300
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del.	600,000	50	200	..

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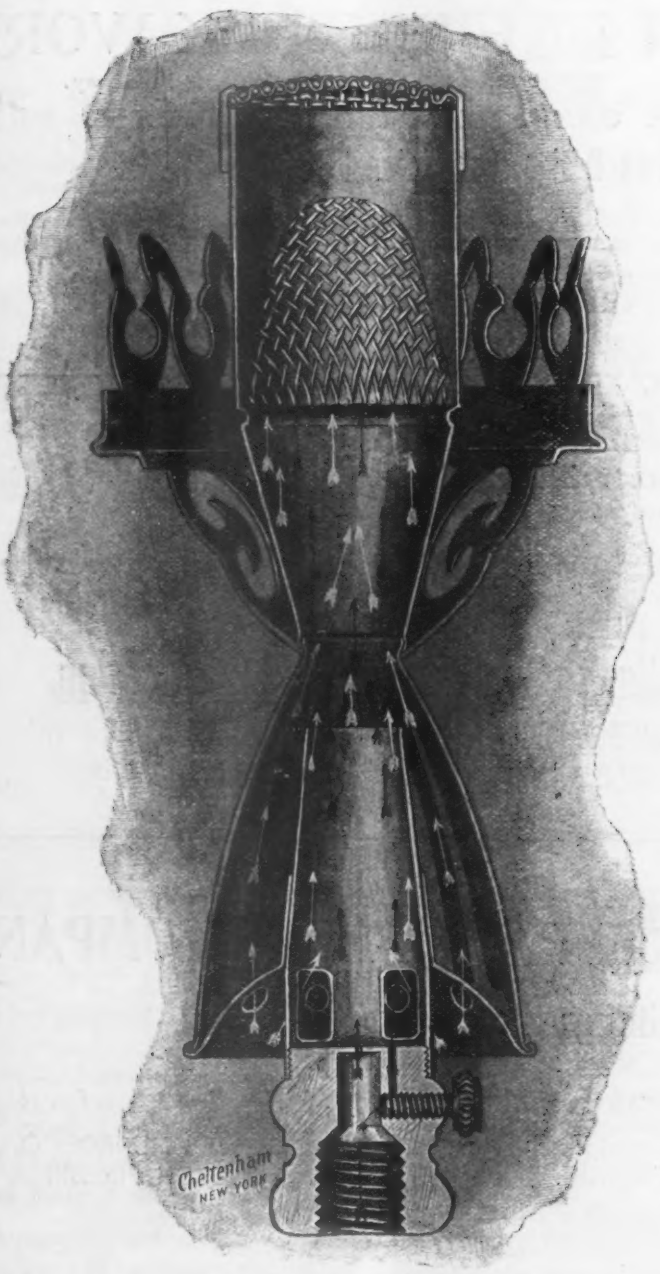

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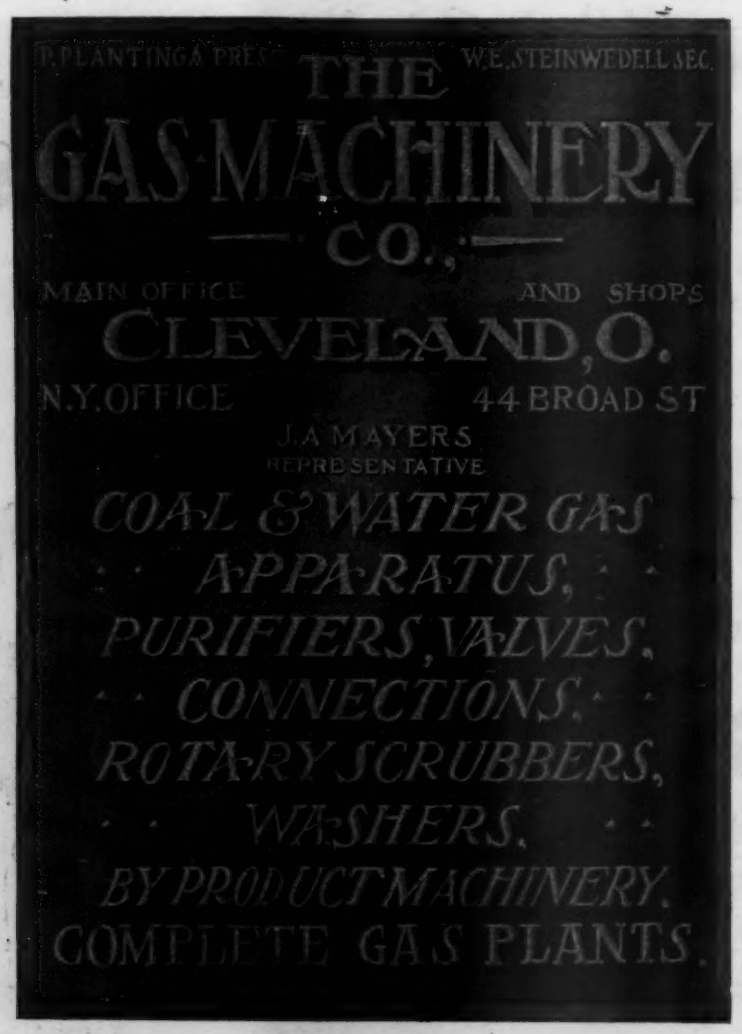

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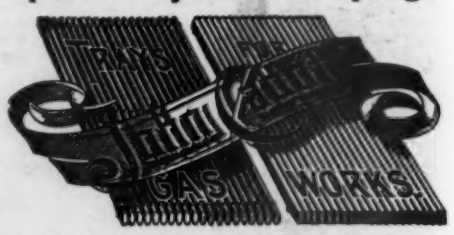

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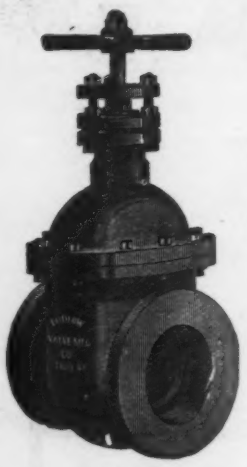

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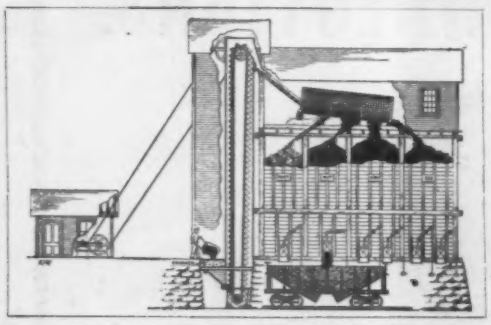

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FIELD'S ANALYSIS FOR THE YEAR 1903.

An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland. Being the 35th year of publication. Compiled and arranged by JOHN W. FIELD, Sec'y and Gen. Mgr. of The Gas Light and Coke Company, London. Price, $5. For Sale by

A. M. CALLENDER & CO., 42 Pine St., New York City.

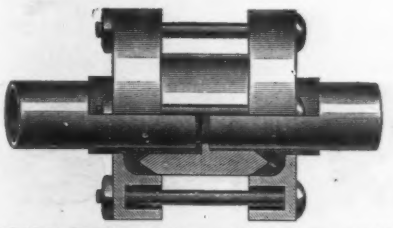
J. F. W. JOST,

CHEMICAL ENGINEER
—IN—
GAS MANUFACTURE,
P. O. BOX 2043, PHILADELPHIA, PA.

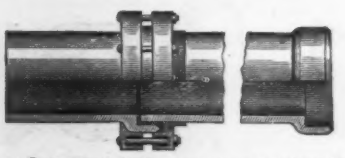
S. R. DRESSER,

BRADFORD, PENNSYLVANIA, U. S. A.,

Patentee and Manufacturer of Specialties for Oil and Gas Lines.

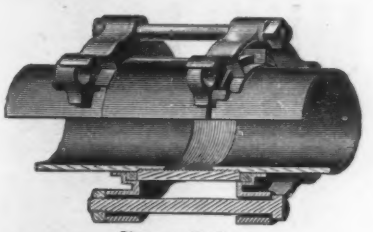


Insulating Coupling for Wrought Iron Pipe. Style 5.

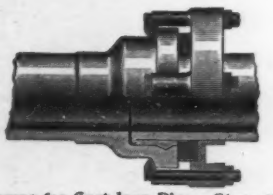


Insulating Coupling for Dresser Bell and Spigot Cast Iron Pipe. Style 6.

Regular Sleeve. Style 2.



Clamp. Style 4.



Clamps for Cast Iron Pipe. Style 4¼.

Pipe Couplings, Sleeves, Clamps, Crosses, Tees and Ells.

My Insulating Coupling prevents the destruction of pipe by electrolytic action, in either water or gas lines.

SEND FOR CATALOGUE.

WHAT PRESSURE DO YOU CARRY AT THE BURNERS?

Let us know this and we will send you samples of the right burner for your pressure. We make Steward Burners checked for 8-10, 12-10, 15-10, 20-10, 25-10 or 30-10, and in sizes from 2-foot to 8-foot.

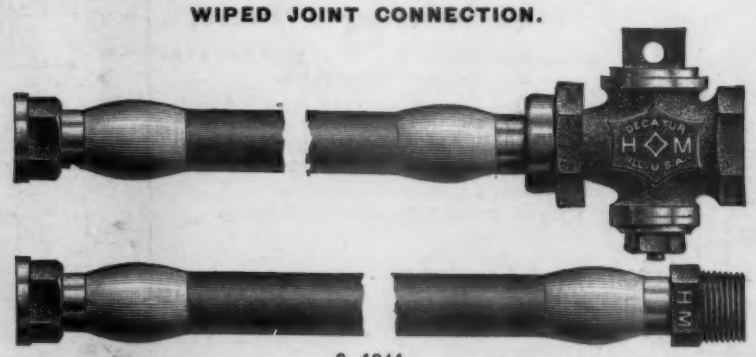
D. M. STEWARD MFG. CO., Est. 1876, CHATTANOOGA, TENN., U. S. A.

LLOYD CONSTRUCTION COMPANY,
DETROIT, MICH.

GAS WORKS BUILDERS.

MUELLER GAS METER CONNECTIONS.

WIPED JOINT CONNECTION.



C—1014.

The strength of a wiped joint meter connection depends most upon the quantity of solder immediately over the joint.

Mueller Wiped Joint Meter Connections are made in the way that gives the joint the greatest strength. Most of the solder is placed directly over the point liable to the greatest strain, but with enough on each side for ample security and a good shape.

Mueller Wiped Joint Meter Connections are made in 270 sizes and specifications. The connections illu trated herewith have straight meter coupling on one end and a union meter cock on the other.

Each set of connections is given a test as nearly like actual service use as possible, bears the Mueller trade mark, and is *unconditionally guaranteed.*

We also make tapping machines and ground key cocks for gas works' use.

Mueller Gas Meter Connections are on exhibit in the Palace of Manufactures, World's Fair.

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ROOTS' GAS EXHAUSTERS.

As further evidence of the superiority of our Gas Exhausters, we are pleased to announce to our friends that we have received the grand prize and gold medal from the World's Fair management, covering our machines, as the best of their class.

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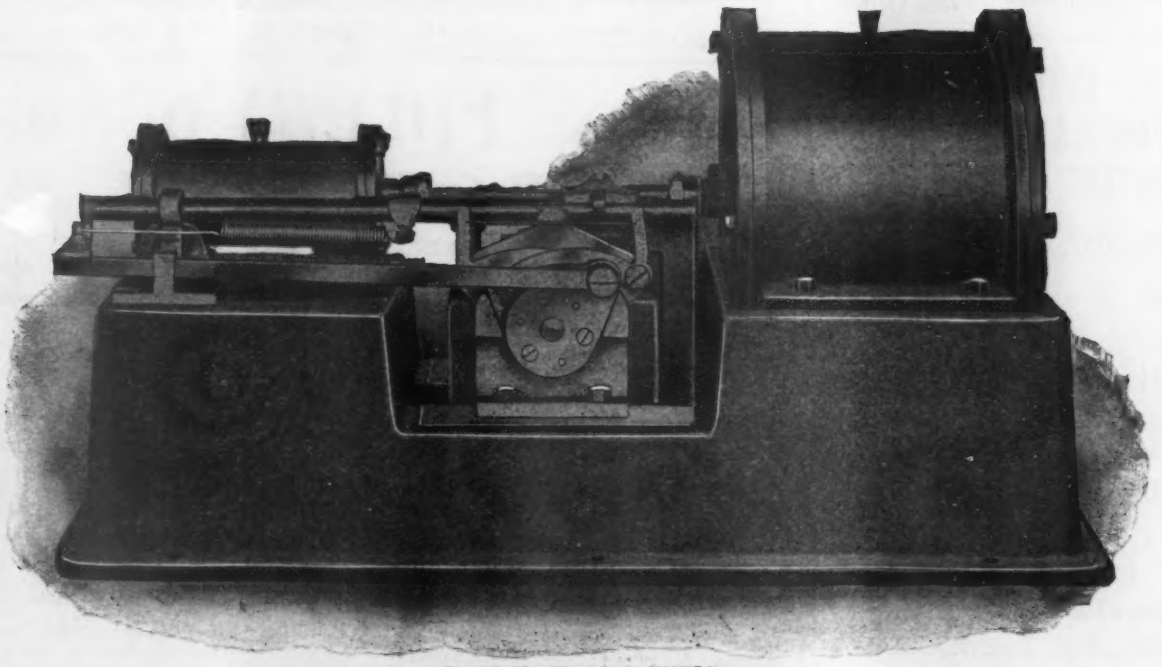
NEW YORK OFFICE, No. 120-122 Liberty St. CHICAGO OFFICE, No. 1547 Marquette Bldg.

COMPTON GAS PRESSURE BOOSTER.



FLOOR SPACE, 9 X 23 INCHES.

An automatic gas booster that increases the lighting power of mantle burners over 500 per cent. Obviates the necessity and expense of high pressure gas mains. Booklet, telling all about it, for the asking, mailed free.

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GAS AND WATER PIPE

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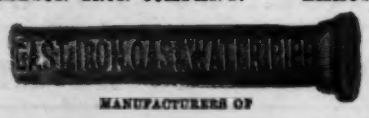
JOHN DONALDSON, Prest., Betz Bldg., Phila., Pa.

EMAUS PIPE FOUNDRY.
DONALDSON IRON COMPANY. EMAUS, PA.



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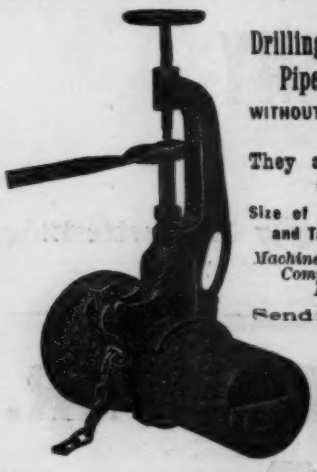
CAST IRON PIPE AND SPECIAL CASTINGS
FOR WATER AND GAS.
Also, FLANGE PIPE, LAMP POSTS, Etc.

GAS TAPPING MACHINES
—FOR—
Drilling and Tapping Pipe under Pressure
WITHOUT ANY ESCAPE OF GAS.
They are Strong and Compact.
Size of Combination Drills and Taps ¾ to 4-inch.
Machines Sent to any Gas Company for Thirty Days' Trial.
Send for Circulars.



Geo. Light,
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THE ECONOMICAL
GAS APPARATUS CONSTRUCTION COMPANY, LIMITED,
Consulting Engineers.
Builders of UP-TO-DATE Machinery and Appliances for Coal and Water Gas Plants. :: :: :: :: ::
PLANS,
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PREPARED.
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Drawings, Specifications and Estimates furnished for the construction of new works or alteration of old works. Special attention given to Patent Office drawings.
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Established 1856. Works at Phillipsburgh, N. J.
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CAST IRON WATER AND GAS PIPE,
FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF
Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

NO LEAKY JOINTS IN UNIVERSAL PIPE.

Specially adaptable for—
High and Low Pressure Gas Mains.
High and Low Pressure Water Mains.
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Flanged Pipe and Fittings, Hydrants, Gates, Pig Lead, Jute, etc.
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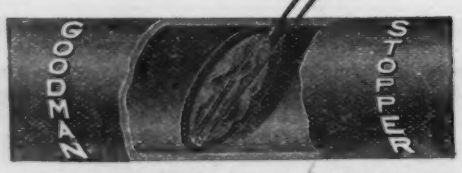
Manufacturers of Lead Pipe, Solder, etc., and Jobbers of Plumbers' and Tinners' Goods.
CAST IRON PIPE and SPECIALS FOR WATER AND GAS.
Wholesale Eastern Agents AKRON VITRIFIED SEWER PIPE.

SAFETY GAS MAIN STOPPER COMPANY,
For Shutting Off Gas in Mains
Temporarily during alterations and repairs. : : : :
Any size gas main can be shut off in 30 seconds. : : :



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Address: SAFETY GAS MAIN STOPPER CO., 108 E. 117th St., New York City.

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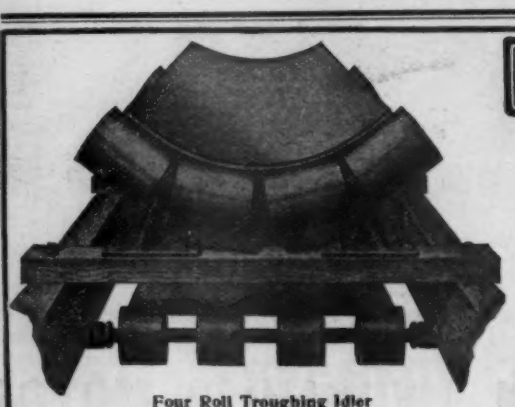
FINE OPENING
GRATE BARS
FOR GAS WORKS.
STATIONARY, SHAKING, DUMPING.
BARS FOR HAZELTON BOILERS.



Four Roll Troughing Idler
FOR WIDE BELTS.
The positions of the rolls conform to a natural and uniform curve of the belt.

BELT CONVEYORS
EQUIPPED WITH
BALL BEARING ROLLS
Possess greater efficiency, consume less power, and the belts last much longer than when any other type of roll is employed.
Permit us to tell you why and to submit plans and estimates.
The Link-Belt Machinery Co.
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AMERICAN METER CO.

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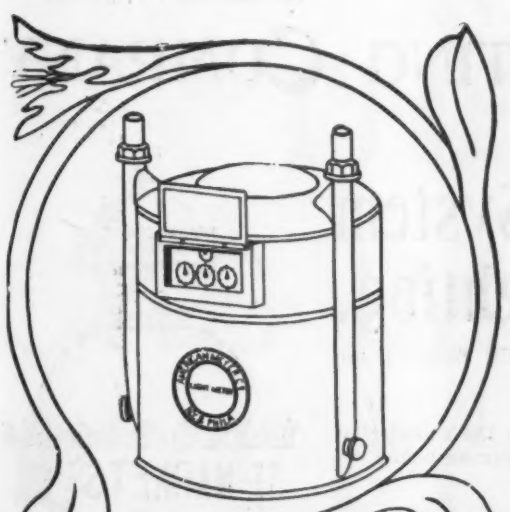
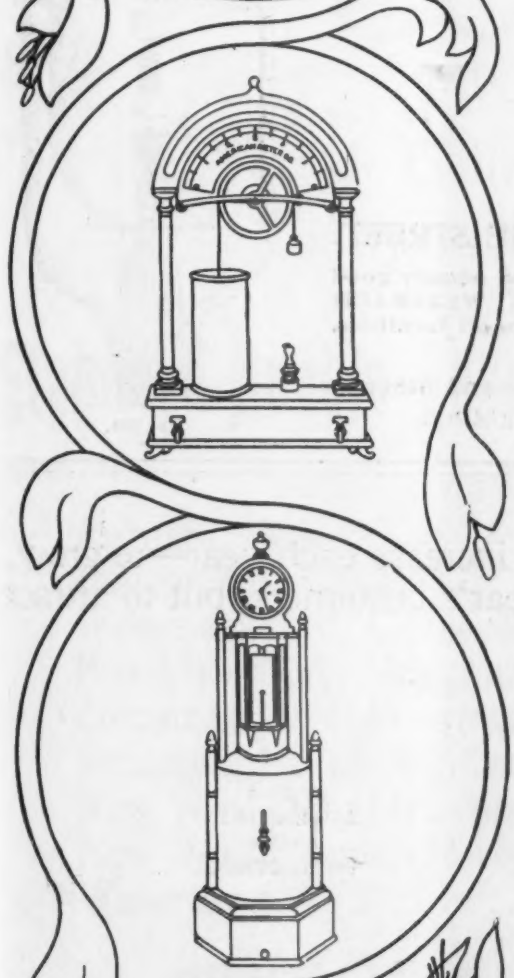
PHILADELPHIA,
CHICAGO,
ST LOUIS,
SAN FRANCISCO.





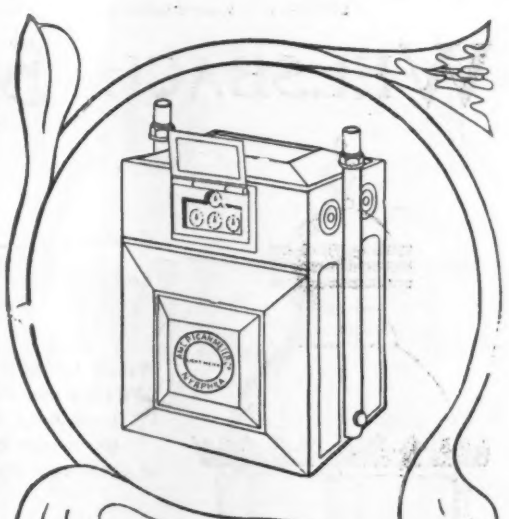
PUBLIC LIGHTING TABLE.

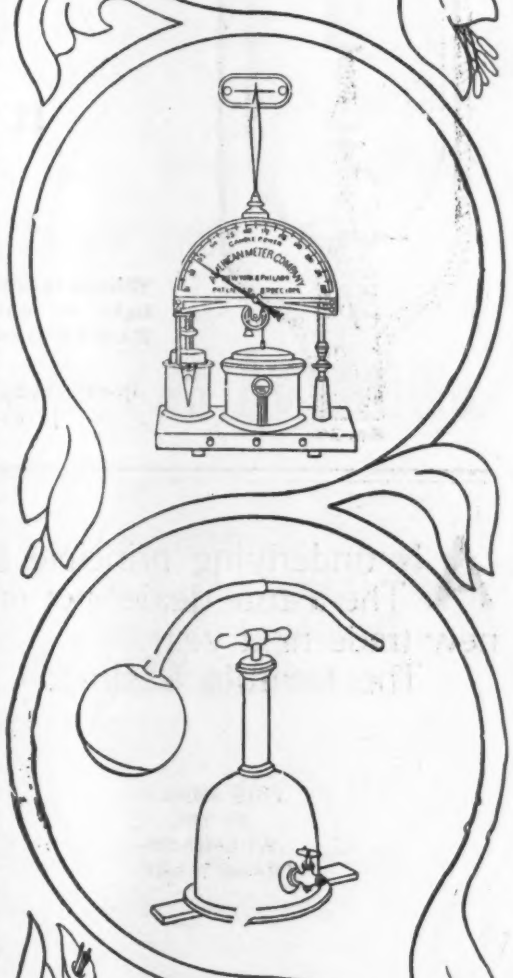
NOVEMBER, 1904.

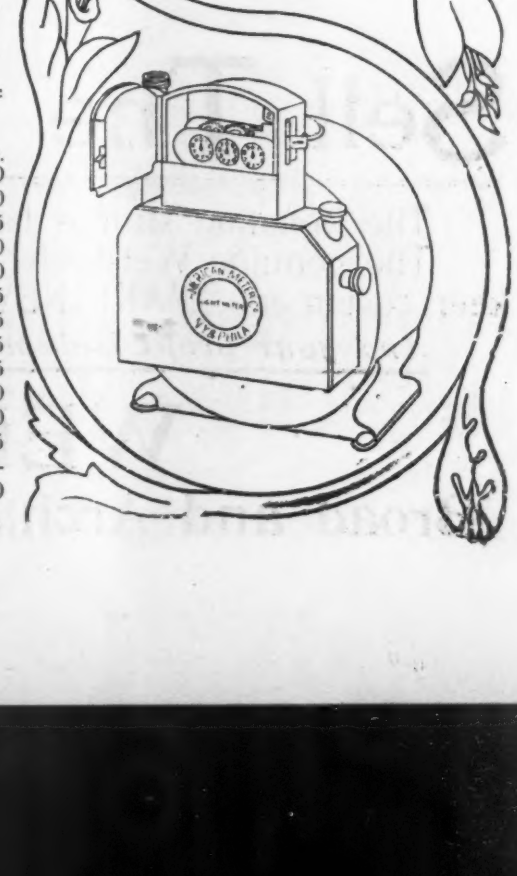
Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. Extinguish.
				P.M.	A.M.
Tue.	1	5.30 PM	1.30 AM	4.45	5.35
Wed.	2	5.30	2.30	4.45	5.35
Thu.	3	5.30	3.40	4.45	5.35
Fri.	4	5.30	5.30	4.45	5.35
Sat.	5	5.30	5.30	4.40	5.45
Sun.	6	5.20	5.40	4.40	5.45
Mon.	7	5.20 NM	5.40	4.40	5.45
Tue.	8	5.20	5.40	4.40	5.45
Wed.	9	5.20	5.40	4.40	5.45
Thu.	10	5.20	5.40	4.40	5.45
Fri.	11	5.20	5.40	4.40	5.45
Sat.	12	8.30	5.40	4.30	6.00
Sun.	13	9.30	5.50	4.30	6.00
Mon.	14	10.30 FQ	5.50	4.30	6.00
Tue.	15	11.20	5.50	4.30	6.00
Wed.	16	12.20 AM	5.50	4.30	6.00
Thu.	17	1.10	5.50	4.30	6.00
Fri.	18	2.10	5.50	4.30	6.00
Sat.	19	3.10	5.50	4.25	6.00
Sun.	20	4.10	5.50	4.25	6.00
Mon.	21	No L.	No L.	4.25	6.00
Tue.	22	No L. PM	No L.	4.25	6.00
Wed.	23	No L.	No L.	4.25	6.00
Thu.	24	5.10 PM	7.20 PM	4.25	6.00
Fri.	25	5.10	8.10	4.25	6.00
Sat.	26	5.10	9.10	4.20	6.10
Sun.	27	5.10	10.10	4.20	6.10
Mon.	28	5.10	11.20	4.20	6.10
Tue.	29	5.10 LQ	12.20 AM	4.20	6.10
Wed.	30	5.10	1.30	4.20	6.10

TOTAL HOURS LIGHTING DURING 1904.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	225.00	January	423.20
February	205.40	February	367.40
March	187.40	March	355.35
April	169.50	April	298.50
May	152.30	May	264.50
June	137.20	June	234.25
July	138.50	July	243.45
August	151.00	August	280.25
September	164.40	September	321.15
October	191.30	October	374.30
November	210.30	November	401.40
December	237.10	December	433.45
Total, yr.	2171.40	Total, yr.	4000.00



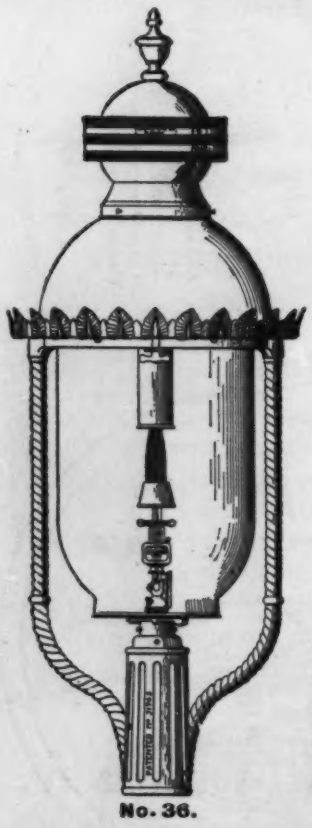




NEW YORK, 97 Liberty Street. BOSTON, 814 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, Foot of Orleans Street. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



No. 36.

Controls and Operates the

Welsbach System of Street Lighting,

Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

AN underlying principle in business is to show an increase each year---to grow. The astute dealer not only seeks to retain this year's customers, but to attract new trade next year.

The formula is simple-

THIS SHIELD IS THE WELSBACH TRADE MARK.

IT IS A GUARANTEE AND A PROTECTION.

Sell The Welsbach Brands.

The imitation stuff is bad for the customer---which is bad for you.

The genuine Welsbachs---Burners or Mantles---make satisfied customers---keep customers---MAKE NEW ONES.

And your profit isn't merely dollars and cents.

WELSBACH CO.,

Broad and Arch Sts., PHILADELPHIA.

THE UNITED GAS IMPROVEMENT COMPANY

For the Period Ending July 31st, 1904, has been Awarded Contracts in the Following Places for

Standard Double-Superheater Lowe Water Gas Apparatus.

Augusta, Me.	Tampa, Fla. (3d contract).
Bangor, Pa.	Westchester, N. Y. (3d contract).
Woonsocket, R. I. (2d contract).	Bridgeport, Conn. (2d contract).
Brooklyn, N. Y. (4th contract).	St. Paul, Minn. (2d contract).
Cincinnati, O. (2d contract).	Harrisburg, Pa.
Scranton, Pa. (3d contract).	Pelham, N. Y.
New York City (14th contract).	Reading, Pa.
New Haven Conn. (2d contract).	Springfield, Mass. (2d contract).
Watertown, N. Y.	Lynn, Mass. (5th contract).

TOTAL SETS, 1904, ... 35
TOTAL DAILY CAPACITY, 1904, . . 50,400,000 cubic feet.
TOTAL SETS TO DATE, ... 543
TOTAL DAILY CAPACITY, . . . 413,180,000 cubic feet.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
Jersey City, N. J.

MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES,
FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

Brooklyn Fire Brick Works,

OFFICE AND WORKS:
88 VAN DYKE ST., BROOKLYN, N. Y.
MANUFACTURERS OF

CLAY GAS RETORTS & SETTINGS, GENERATOR LININGS. SPECIALTIES.

Established 1854. Incorporated 1869.

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Fire Brick Manufg. Co.,

Manufacturers of { GAS RETORTS . .
FIRE BRICK . . .
RETORT SETTINGS

Water Gas Cupola Linings, Fire Clay, Etc.

Proprietors for the U. S., Coze System of Inclined Benches.

Estimates Furnished on Application for Most Successful Style of Construction.

Also for Free-Firing and Full and Half-Depth Regenerative Benches, for Burning either Coal or Coke in the Furnaces.

Office: Cor. Manchester and Sulphur Avenues, St. Louis, Mo.

Established 1845. Reorganized 1902.

The Kreischer Brick Mfg. Co.,

Manufacturers of the very best quality of Clay Retorts, Blocks, Tiles, Settings and Firebrick of every description.

Also Miners and Shippers of Fireclay, Fire Sand, Ground Brick in Barrels.

WORKS: KREISCHERVILLE, STATEN ISLAND.
OFFICE: 119 E. 23D STREET, NEW YORK CITY.

Adam Weber Sons.

GENERAL OFFICES: Park Row Bldg., N. Y. City.
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ERECTION OF

Modern Coal Gas Plants,

With either Horizontal, Inclined or Vertical Retorts.

PATENTS APPLIED FOR.

No. 1. Firing horizontal benches with pulverized fuel, with either 8 or 10 retorts in 1 setting, using one furnace for two benches. Great saving in labor, fuel and life of retorts and settings. No elaboration of complex recuperation.

No. 2. Independent retort settings, taking all weight from retorts.

No. 3. Vertical retorts with vertical charge and discharge. Sixteen retorts in one bench.

MODERN BENCH IRONWORK.

ISAAC C. BAXTER, President. ESTABLISHED 1864. PETER YOUNG, Sec'y and Treas.

Works. LOCKPORT STATION, PA.

JAMES GARDNER, JR., CO.,

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Successor to WILLIAM GARDNER & SON.

Fire Clay Goods for Gas Works.

HENRY MAURER & SON,

(ESTABLISHED 1856.)

EXCELSIOR FIRE BRICK & CLAY

RETORT WORKS

WORKS, Perth Amboy, N. J.
OFFICE, 416 to 422 East 23d St., N. Y

Clay Gas Retorts,

BENCH SETTINGS,

Fire Brick, Tiles, Etc.

GEROULD'S IMPROVED RETORT CEMENT

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

Price List, f.o.b. BLOOMINGTON, INDIANA.
In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

C. L. GEROULD, BLOOMINGTON, IND.

For orders East of Buffalo, N. Y., or Pittsburg, Pa., freight will be paid to these points.

Bristol's Recording
PRESSURE GAUGE.

For continuous records of Street Gas Pressure. Simple in construction, accurate in operation and low in price.

Fully Guaranteed. Send for Circulars.

THE BRISTOL CO.,
Waterbury, Conn.

Silver Medal, Paris Exposition.

GASHOLDER TANKS AND GAS WORKS MASONRY COMPLETE.

Plans prepared and Estimates furnished at short notice.

J. P. WHITTIER,
238 Java Street, Brooklyn, N. Y.

THEO. J. SMITH, Prest. J. A. TAYLOR, Sec.
A. LAMBLA, Vice-Prest. and Supt.

BALTIMORE
RETORT & FIRE BRICK CO.

MANUFACTORY AT
LOCUST POINT, BALTIMORE, MD.

Clay Retorts, Blocks & Tiles

FIRE BRICK, FIRE CLAY, AND FIRE CEMENT.

Our Improved Half and Full Depth Benches have been Adopted by Many Gas Companies.

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Sole Agents for New England States.

JOHN DELL,
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MISSOURI FIRE BRICK CO.,

ESTABLISHED 1882.

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Gas Retorts, Bench Settings, Fire Brick, Cupola Linings, Etc.

We are the **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** **The Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One** *to* **Six Retorts.**

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Bronder Patent Stoking Machinery.

Three-Scoop and Three-Rake Charging and Discharging Machines are operating in New York, Newark, N. J., Philadelphia, Worcester, Mass., Mt. Vernon, N. Y., Toronto and Montreal, Canada.

Four-Scoop and Four-Rake Charging and Discharging Machines are operating in Detroit, Mich.

These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

Hot Coke Conveyor, Quencher and Steam Exhauster, operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins, a Specialty.

G. A. BRONDER,

Contracting Engineer and Builder,

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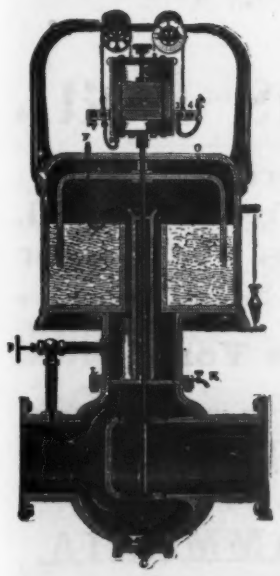

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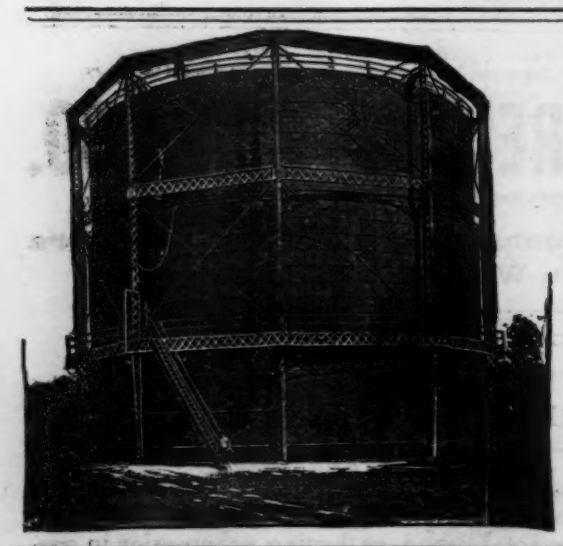

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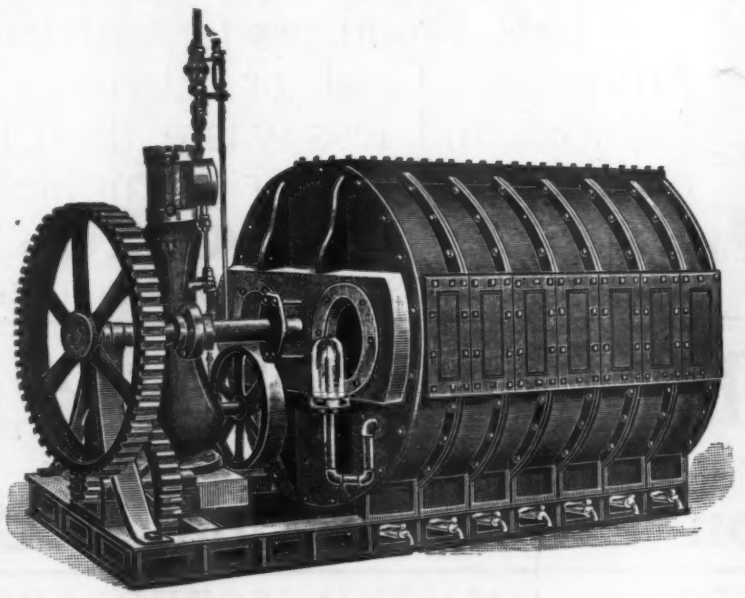

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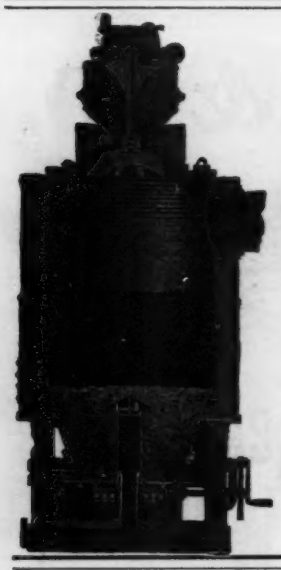

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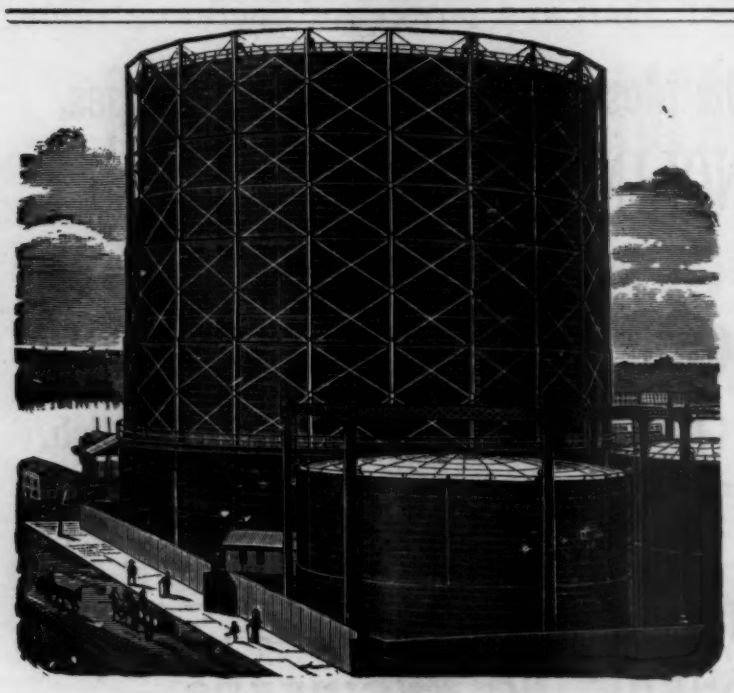

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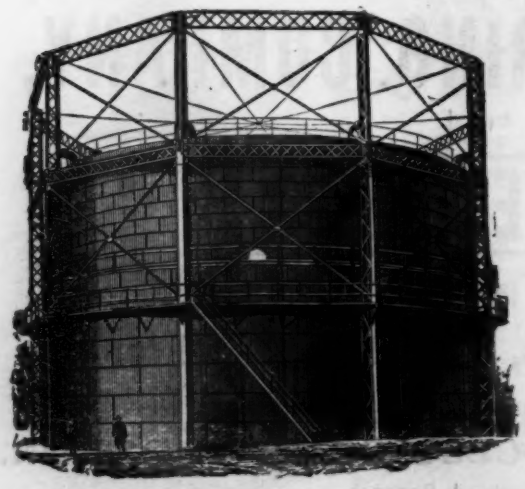

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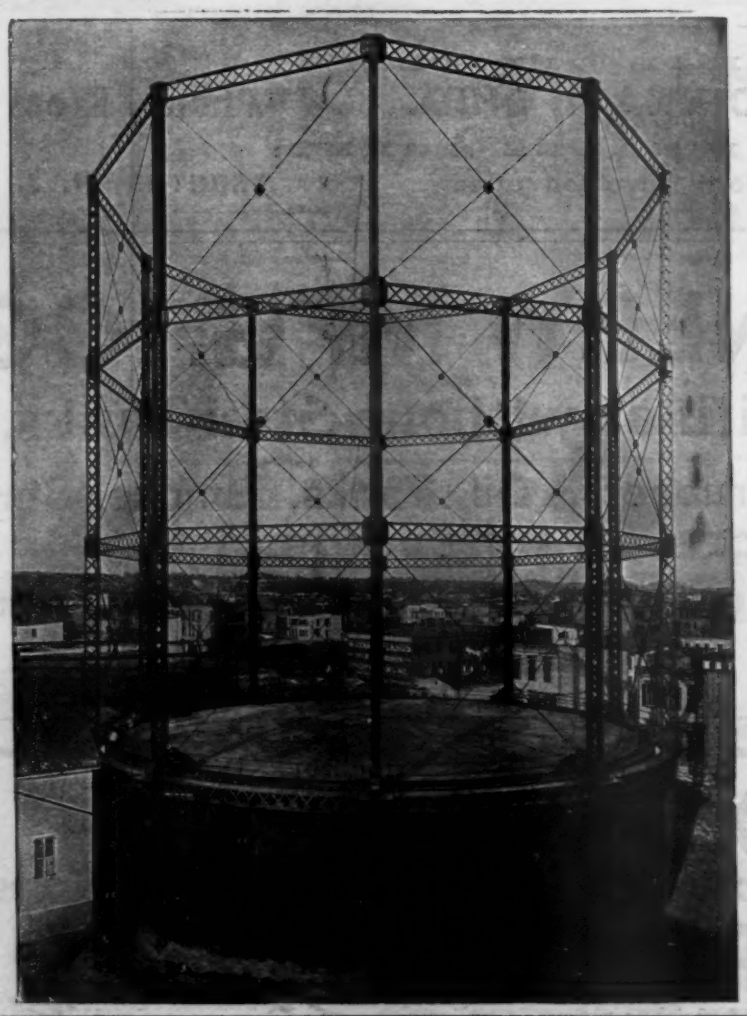

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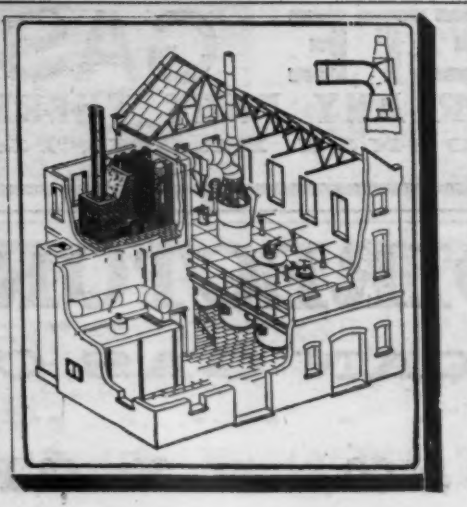

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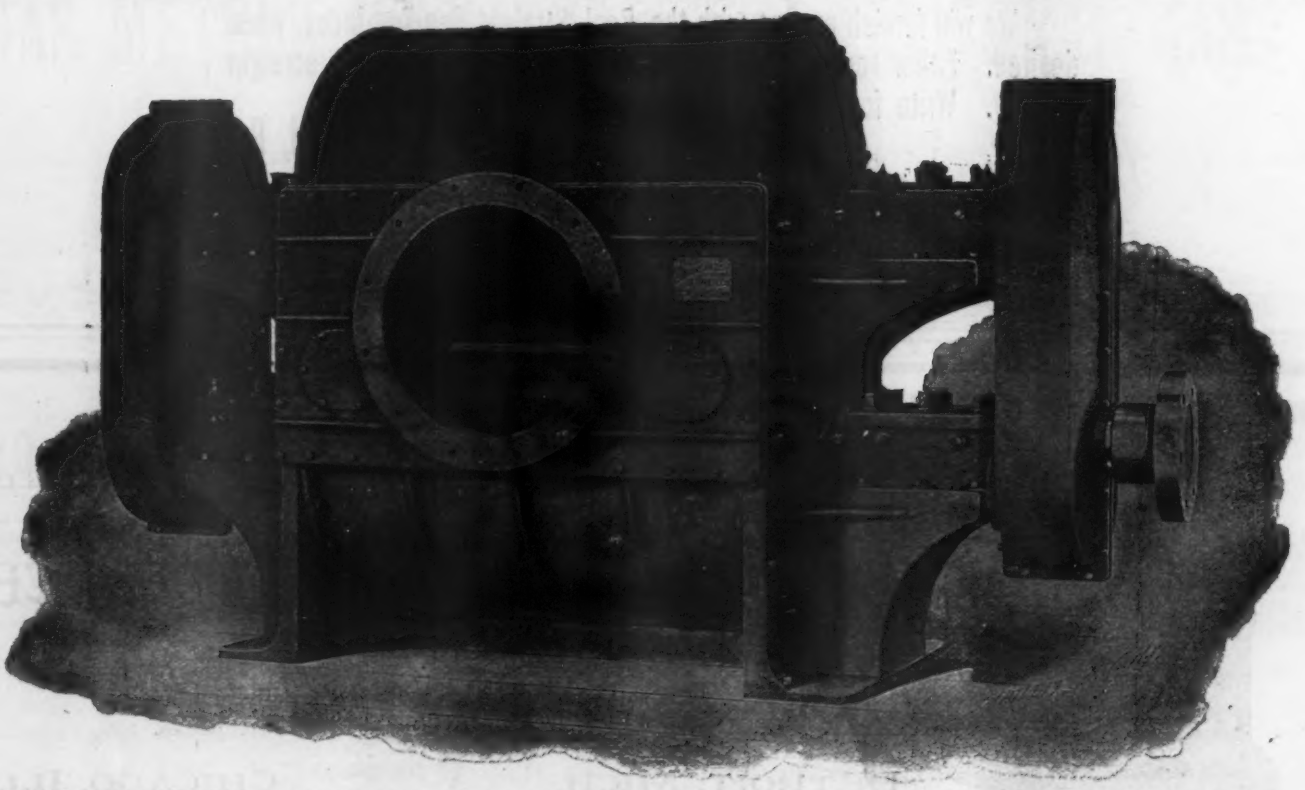

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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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Where to Find the Western Gas Association's Exhibit, and the Custodian Thereof, at the World's Fair.

To the Fraternity: The exhibit of the Western Gas Association, at the World's Fair, St. Louis, is located in Section 33A, Liberal Arts Building, where Mr. Fred. R. Persons, who is in charge of the same, will always be on hand to receive visitors and to explain anything that requires explaining.

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Bureau of Information, Ohio Gas Light Association.

CITY OF LINCOLN GAS CO., LINCOLN, ILLS., Oct. 10, 1904.

To the Fraternity: At the last meeting of the Ohio Gas Light Association a Bureau of Information was decided upon, the idea of which is to render assistance to members who may have questions coming up or difficultles arising respecting which they would like some help. This Bureau has been established and is now ready for business. A number of co-Editors have been appointed to whom the various questions will be referred. As this is the first Bureau of Information attempted by any Association, it is hoped that the members will take advantage of its opportunities. The co-Editors are as follows:

Distribution.—E. E. Eysenbach and M. E. Malone.

Accounts and Bookkeeping.—D. W. Low and Chas. Ritter.

New Business and Gas Appliances.—Frank D. Moses, Ralph Woodward and F. Cavanagh.

Chemistry.—H. B. Harrop and Clarence Lomax.

Retort House.—Moses Coombs.

Natural Gas.—W. H. Hammon and Geo. W. Barnes.

All questions should be addressed to the Editor, at Lincoln, Ills.

Very truly yours,
H. L. OLDS, Editor Information Bureau.

[OFFICIAL NOTICE.]

Wrinkle Department, Western Gas Association.

OFFICE OF EDITOR WRINKLE DEPARTMENT, ST. LOUIS, MO., July 25, 1904.

To the Members of the Western Gas Association: We again invite contributions to the Wrinkle Department of the Western Gas Association for the meeting of 1905. The Editor wishes to call the attention of the members of the Western Gas Association, and of the gas fraternity at large, to the fact that the "Western" has done good work in this department in the past; that its Wrinkles have been of value to many, and that it proposes to continue the good work.

The Editor further wishes to suggest that an earnest effort be made to improve the quality of the Wrinkles submitted, as a great many of the devices, while of undoubted practical value, are such as any gas works' foreman should know. We desire the Wrinkles which have a greater bearing on the scientific and technical portion of our business. Of course, there will always be room for the little, handy, practical devices, which so often help us over the rough places. We will gladly receive them, but we should all aim to place the gas business on a par with other scientific and engineering enterprises which are practically in a basis of exact knowledge and high efficiency.

To that end, therefore, we desire to secure a large collection of Wrinkles for the 1905 meeting. Give us the benefit of the mathematical, chemical, thermal and other devices which have helped you in designing or improving your plants; do not hesitate to send in the practical devices which are not on record so far; submit the ideas which have made the business end a success; and, finally, let every individual

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—OF THE—

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MR. E. H. YORKE, NEW HAVEN, CONN., Dec. 1, 1898.

Dear Sir:—I am in receipt of a copy of "Excerpts from the Decisions of the Board of Gas Commissioners," which is a handy compilation in book form of extracts from the most recent decisions of the Gas Commission of Massachusetts.

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Yours truly, (Signed) F. C. SHERMAN, Superintendent.

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BEFORE.

This is a photograph of a 3-light regular meter out of a lot of meters received from the Coatesville Gas Co., Coatesville, Pa., to be repaired and converted into prepayment meters.

AFTER.

This is the same meter after it has been repaired and converted into a new prepayment meter.

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